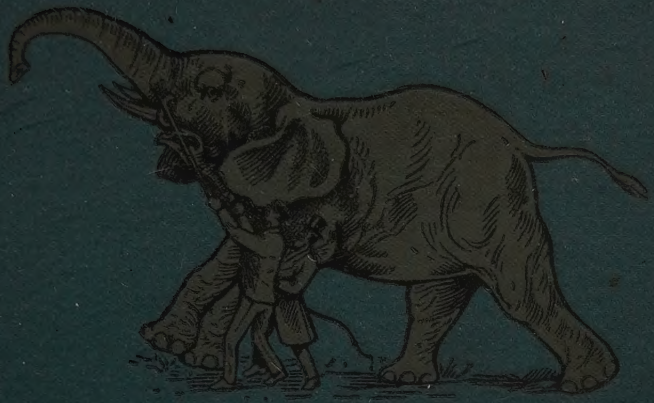


WILD · ANIMALS IN · CAPTIVITY

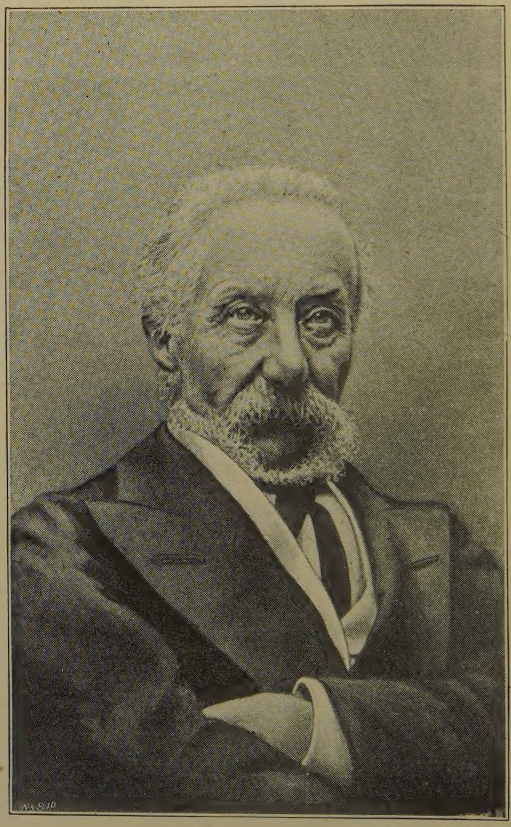
A · D · BARTLETT'S · EXPERIENCES AT · THE "ZOO"

Rhoda M. Clarke

from Uncle Laurie

Xmas 1898.

WILD ANIMALS IN CAPTIVITY



A. D. BARTLETT, ABOUT 1871.

WILD ANIMALS IN CAPTIVITY

BEING AN ACCOUNT OF THE

HABITS, FOOD, MANAGEMENT AND TREATMENT OF THE BEASTS AND BIRDS AT THE 'ZOO'

WITH

Reminiscences and Anecdotes

BY

A. D. BARTLETT

LATE SUPERINTENDENT OF THE ZOOLOGICAL SOCIETY'S GARDENS
REGENT'S PARK

COMPILED AND EDITED BY

EDWARD BARTLETT, F.Z.S.

LATE CURATOR OF THE MAIDSTONE MUSEUM, AND OF THE SARAWAK MUSEUM
ETC., ETC.

WITH ILLUSTRATIONS

LONDON: CHAPMAN AND HALL, Ld.
1898

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LONDON & BUNGAY.

THE EDITOR,

By permission, dedicates

THIS BOOK TO

SIR W. H. FLOWER, K.C.B.

PRESIDENT OF THE ZOOLOGICAL SOCIETY OF LONDON

WHO, IN KINDLY GIVING THIS PERMISSION, WRITES

THAT HE WAS "FOR EXACTLY FIFTY YEARS IN PRETTY

CONSTANT ASSOCIATION WITH HIM," THE EDITOR'S FATHER,

"AND SO HAD AMPLE OPPORTUNITIES OF

OBSERVING HIS UNTIRING DEVOTION

TO THE ADVANCEMENT

OF ZOOLOGY."

PREFACE

My father, by his will, devised all his books, papers, writings, drawings, and scientific publications to me for the purpose of publishing his personal experiences with wild animals in captivity, and interesting anecdotes, etc., connected with his life.

I may say that the materials for this work, when placed in my hands, were in such a state of chaos that I began to despair of ever being able to get them into any form for publication, but by careful study of the fragmentary papers and rough notes, I have, I hope, succeeded in my humble efforts to bring together an amount of readable matter which may prove interesting, useful, and instructive to the reader.

Much of the matter herein published appeared in *Land and Water*, *The Field*, *Proceedings of the Zoological Society*, *Punch*, and other publications, either anonymously, or under his *nom-de-plume* "D. A. B.," and others in his own name.

I must take this opportunity of acknowledging the kindness of the Council of the Zoological Society of London, of the Proprietors of *Land and Water*, of *The Field*, and of *Punch*, for allowing me to reproduce my father's papers, etc. To Dr. P. L. Sclater and F. H. Waterhouse, Esq., and to my brother-in-law Mr. Albert

Goodwin, F.Z.S., I am greatly indebted for much valuable assistance in carrying out my father's wishes.

The principal illustrations—some of which have been taken from E. Griset's original fancy drawings, now in my possession—of events which have from time to time occurred in the Zoological Gardens, are by Mr. A. J. Elwes.

I have a great number of letters in which the writers ask a large and varied series of interesting zoological questions of my father, and it has occurred to me that at some future period I might be able to compile this correspondence by giving the questions and the answers thereto, provided I could secure the loan of the answers, or copies of them, from those persons in whose possession they are.

I should, therefore, feel very grateful if a copy, or the original, of all the interesting letters written by my father could be sent to me by the recipients for reproduction among other material which I may think of publishing hereafter.

It will be understood that all those who so desire shall have the original letters returned to them.

In conclusion, I would mention that I have ventured to record in this volume my own observations and remarks, which I have thought would be interesting, not only to those who were intimately associated with my late father, but also to those who knew him simply by repute.

EDWARD BARTLETT.

15 Bartholomew Road,
London, N. W.
March 1898.

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BIOGRAPHICAL NOTES

BY EDWARD BARTLETT.

ABRAHAM DEE BARTLETT was born on October 27, 1812. He died on May 7, 1897, in his eighty-fifth year, after a long and painful illness, and was laid to rest in the family grave in Highgate Cemetery.

I have succeeded in collecting from among some scraps of paper the following notes made by my father, and which I reproduce as nearly as possible in the original words:—

"My origin is a very humble one. My father (John Bartlett) was apprenticed to and, after serving his apprenticeship, employed by the father of one of the greatest of English painters, whose name was Turner. But my father, as a tonsorial artist, used the brush upon living portraits which are no more, while young Turner's brush was wielded in oil-colour on canvas to represent living portraits, and consequently the wonderful productions of his brush are to this day preserved.

"I had, however, one opportunity which laid the foundation of, and the stepping-stone to, my insatiable love for animals. Mr. Turner lived in Exeter Street, Strand, and the wonderful collection of wild beasts was then at Exeter 'Change. It was here that I was, during my infancy, introduced to wild animals. Mr. Cross, the proprietor, being a great friend of my father, allowed me a free *entrée* to that very remarkable and interesting menagerie. In consequence of my early introduction to wild animals, almost before I could walk, I being allowed to crawl about in the beast-room of that menagerie, playing with young lions and other animals that were not likely to harm me, I have not the remotest recollection of seeing for the first time lions,

tigers, elephants, or any other wild beasts, simply because I was almost from my birth among them. Since then I have had the good fortune to have the management of the extensive collection of the Zoological Society, and the familiarity with wild beasts in my infancy has been of invaluable service to me.

"During the early period of my life, Mr. Cross, noticing how fond I was of living birds and other animals, kindly offered me the dead bodies of some of the birds which I was so fond of feeding. This led me to endeavour to save their beautiful feathers and skins from decay. I was not long in being able to take off and prepare their skins so as to preserve them for future use. The result of this was that I became a successful taxidermist.

"It was from about 1820 to 1826 that I was allowed to walk about the beast-room, as it was then called, at Exeter 'Change. My next seven or eight years were less agreeable, having been apprenticed in 1826 to my father John Bartlett, hairdresser and brush-maker of 83 Drury Lane, a business I most heartily detested, although I used to amuse myself by preserving birds, etc., in my own private room in the house. Somewhere about 1833 or 1834 I determined again to seek the society of wild animals; but as I could not offer myself as a keeper, and as I had no means of becoming a proprietor, what was I to do? It then occurred to me that I could become a taxidermist; having so early taken to wild animals, it was obvious to me that I must live among them without being one myself, and this I could do by preserving specimens of Nature's most beautiful works.

"My introduction to the Zoological Society was through a very able physician, Mr. Anthony White of Parliament Street. I thus became acquainted with Mr. Yarrell, W. Ogilby, John Gould, W. Gillett, and others (the Society's Museum was in Bruton Street at this period), and I was a correspondent of Mr. D. W. Mitchell, who then resided in Cornwall. Now Mr. Mitchell came to London, and learned from me much about the affairs of the Society.

"This resulted in his obtaining the Secretaryship, greatly to my astonishment. He did not fail, however, to consult me upon the subject of the future prosperity of the Society, and this led to the opening of the Gardens to the public on payment of sixpence, on Mondays. The success of this concession to the public has undoubtedly brought about the popularity of the collection and its advancement to its present condition.

"My introduction to the authorities of the British Museum

was very funny. An old barber who attended to Sir Henry Ellis, then Governor of the British Museum, undertook to introduce me to Sir Henry, who then and there introduced me to Dr. J. E. Gray (?) or his predecessor.

"I became acquainted with Dr. J. E. Gray, Mr. G. Gray, Dr. Mantell, Prof. Owen, the Dean of Westminster, the Bishop of Oxford, Sir Charles Lyell, Charles Darwin, Prof. Huxley, F. Fuller, Yarrell, Ogilby, Gould, Blyth, and Sir Joseph Paxton. These were the names of a few of those that I have worked with, or worked for, and most of them acknowledged my assistance.

"I have already described my early introduction to the menagerie at Exeter 'Change, and how, during my boyhood, I saw from time to time birds that had died in the menagerie, which were given to me on my expressing a desire to preserve their skins and feathers. I gradually became an expert in skinning and preparing these creatures, and in the course of time I succeeded in mounting, or, as it is commonly called, stuffing, various specimens. My fondness for this art induced me to commence to obtain a livelihood at it, in which I succeeded beyond my expectations. In the Exhibition of 1851 I was fortunate enough to be awarded the first prize for my specimens of taxidermy which I exhibited, viz. :—Eagle under glass shade, diver under glass shade (the property of her Majesty the Queen), snowy owl, Mandarin duck, Japanese teal, pair of Impeyan pheasants, sleeping ourang-utang, sun bittern, musk deer, cockatoo, foxes ; carved giraffe ; two bronze medals from the Zoological Society ; model of dodo ; dog and deer ; crowned pigeons ; leopard and wolf."

RESTORATION OF THE DODO.

The earliest record which I can find respecting the restoration of the Dodo by my father, is contained in a letter to H. E. Strickland, which I copy :—

"16A, *Great College Street, Camden Town,*
"*September* 25, 1848.

"SIR,—I beg respectfully to inform you that I have just completed what appears to me a perfect restoration of the long-lost Dodo, and am anxious that you should be the first person to see it. I shall feel much obliged if you will have

the kindness by return of post to let me know if there is any hope of your calling at my house for that purpose. You may feel some surprise at the suddenness of this announcement and my not having shown it to any one, or allowed any person to know it was in progress. My reason for this was having long studied the subject, carefully examined all the parts, the paintings, etc. (I visited the Hague last year for the purpose of examining the picture in that collection), and formed my opinion respecting the bird, I commenced it at once, taking care no part should be seen until it was complete, for fear the views of others might differ from my own and I might be confused ; again, the work being attended with much difficulty, requiring considerable skill, much time and perseverance, I was fearful of being annoyed by the impatience of my friends had they known it was in progress. As you already know, Dr. Melville lived in my house several months and wrote the second part of the Dodo book here, yet, to this hour, has no idea that I had it in hand. You will see that I possessed peculiar advantages during the time Dr. Melville lived here, having the head and foot from Oxford for his use, and he kindly allowed me to examine these parts whenever I pleased. I thus had the opportunity of examining the head more than once in a *wet* state, an advantage that may never occur again to any one (it was soaked in water by Dr. Melville for the purpose of turning the skin over the skull to display the bony structure). In this state it was of the greatest use to me, and enabled me to form a more correct idea of the bird's head than I could gain by any other means, and I finished my model of the head before the real head left my house, so that I had an opportunity of comparing them.

"I had an equally good chance with the Didunculus, which Dr. Melville placed in my hands for the purpose of obtaining the *skull* and *leg-bones*, which I did and afterwards replaced them. This added much to my knowledge respecting what I might expect was the natural size, *form* and condition of the *horny* part of the *bill* of the Dodo, and I finished it accordingly, quite to my own satisfaction ; and I hope when seen by you and others competent to judge, it will be considered sufficiently perfect and complete to justify the great amount of time I have devoted to it.

"I should feel much obliged if you would have the kindness to obtain for me a cast of the Dodo's head and foot to put by the side of the model."

REPORT OF THE JURIES, 1851.

The number of British exhibitors is thirteen. Of these the following deserve especial notice. A. D. Bartlett (291, p. 817) exhibits an ingenious example of the art in the constructed figure of the Dodo—a bird which was once a native of Mauritius, and found there in considerable numbers at the beginning of the last century, but now, as far as is known, entirely extinct. The drawings of Savery, preserved in the Belvedere at Vienna, and in the Royal Gallery at Berlin, and some remains of a skeleton formerly in the collection already alluded to, of Elias Ashmole, consisting now but of the head and one foot, are the data from which the figure has been compiled. The process is of course very different from that of preserving a real animal, the skeleton and skin of which are entire; an artificial body has to be constructed and then covered, feather by feather, with such plumage as is most in accordance with our knowledge of the bird. This has been very skilfully executed, and the result, by the testimony of Mr. Strickland and of Mr. Gray of the British Museum, "represents with great accuracy the form, dimensions and colour of the Dodo, as far as these characteristics can be ascertained from the evidences which exist," whilst it "does great credit to Mr. Bartlett's skill and to his practical acquaintance with the structure of birds."

There are other specimens exhibited by Mr. Bartlett which are perhaps more attractive, inasmuch as they represent nature with a fidelity of which all can judge. The pair of Impeyan Pheasants, entitled "Courtship," and the sleeping Ourang-utang, "Repose," are especially deserving of notice. The fleshy parts of the latter have been very skilfully treated; and the dried and shrivelled appearance which they so often assume is entirely avoided.

The skeleton of the Ourang-utang has been preserved and also the viscera; the whole forming an example of the manner in which rare specimens should be dealt with in order to secure accurate information to the naturalist, and to promote the advancement of science.

List of Awards.

A. D. Bartlett, Great College Street, Camden Town (Class xxix. 291, p. 817), prize medal for a model of the Dodo, and several excellent examples in the higher branches of taxidermy.

Now it appears that the model of the Dodo was thought so much of by the scientific world that they allowed it to go down to the Crystal Palace at Sydenham, and there it was destroyed in the great fire of 1866 and lost for ever.

It will be seen from the foregoing notes that at a very early age my father evinced a great delight in all matters connected with Natural History. In those early days of his career scientific men as well as collectors of rare birds, and especially of rare birds' eggs, made his house a resort, and the reputation of his extraordinary skill in the art of taxidermy became so widely spread that he was obliged to remove into larger premises about the latter part of the year 1846. It is probable that there are few, if any, of those early zoologists and collectors still living who remember that he removed his business to a large house in Great College Street, Camden Town. In his new home his circle of admirers increased, many of whom were the founders of the Zoological Society of London, and then it was that his first business connections with that Society commenced.

It was in that house he worked not only for the Zoological Society, but for nearly all the scientific men of the age, and established museums. He was also honoured with commands from her Majesty the Queen, and H.R.H. the Prince Consort. He there prepared all his exhibits for the 1851 Exhibition, among which, by permission of her Majesty, several of the Queen's specimens—referred to above in his reminiscences—which are believed to be now at Windsor Castle.

After the close of the Exhibition of 1851 the Crystal Palace Company was formed, and my father in his notes says:—"this led to my appointment as Naturalist to the Company in 1852." In the November, a few months after his taking up the post at the Palace, he was cast down

by gastric fever, which confined him to the house for some months.

With regard to work at the Palace he goes on to say:—"I was, as well as Sir Joseph Paxton, disappointed at the result of our exertions to render that noble building one of educational greatness; alas! amusements such as Punch and Judy, tight-rope dancing, round-abouts, etc., set all other considerations at naught."

I can well understand the above remarks when I find that, after all the labour and money which was expended on the Natural History department in the south transept of that Palace, the large groups of animals and figures, to the preparation and arranging of which my father devoted so much time, were by degrees destroyed by the gardeners who had introduced live plants among them. These Vandals, having no other thought but the preservation of their plants, watered not only plants, but figures and stuffed animals, all at the same time. This of course hastened their decay. The laborious, though unsatisfactory, work of trying to preserve the Natural History specimens continued up to 1859. At the death of Mr. John Thompson, the Superintendent of the Zoological Gardens, Dr. P. L. Sclater, the then newly-appointed secretary, in course of conversation with Mr. Henry Walter of *The Times*, remarked that they (the Society) were seeking a new man for the post. Mr. Walter at once recommended my father, who was immediately communicated with, and in August 1859 appointed Superintendent at a salary of £200 per annum and residence.

Since taking up his abode in the Gardens he became a walking Zoological Encyclopædia. Judging from the mass of correspondence, alone, which has come into my possession, it is evident that, notwithstanding his onerous and responsible duties in looking after the keepers, animals,

buildings and gardens, he found time to record his experiences for the benefit of science and for the instruction and amusement of the animal-loving public.

The following is a list of A. D. Bartlett's scientific papers, published in the *Proceedings of the Zoological Society*, which may appear eventually in a separate form :—

ZOOLOGICAL PAPERS AND NOTES, 1839–1896.

1839	Pink-footed Goose	page 2
1847	Paget's Pochard	„ 48
1850	Apteryx	„ 274
1851	Didus : Dodo bones	„ 280
1856	Lepidosiren	„ 346
1857	Chinese Sheep	„ 104
1857	Himalayan Rabbits	„ 159
1859	Salmon Hatching	„ 125
1859	New Emeu	„ 205
1859	Herring Gull	„ 467
1859	Preserving Eggs	„ 468
1860	Goose Head	„ 99
1860	Nicobar Pigeon	„ 99
1860	Hybrid Bears	„ 130
1860	Eggs of Struthiones	„ 205
1860	Telegalla	„ 426
1860	Balæniceps	„ 461
1861	Pink-footed Goose	„ 19
1861	Black-footed Rabbits	„ 40
1861	Hybrid Ducks	„ 44
1861	Balæniceps	„ 131
1861	Breeding Felidæ	„ 140
1861	Japanese Pig	„ 263
1861	Chinese Crane	„ 369
1861	Polar Bear	„ 391
1862	Kagu	„ 218
1862	Aye-Aye	„ 222
1862	Beavers	„ 267
1862	New Lamur	„ 347
1863	New Galago	„ 231
1864	Common Partridge	„ 649

1865	Prong Buck	page 718
1866	Jaw of Kangaroo	„ 28
1866	Breeding Birds	„ 76
1866	Stringonyx anderssoni	„ 324
1867	Rufous Tinamou	„ 687
1867	Lyre-bird	„ 688
1867	Walrus, food of	„ 819
1868	Breeding Birds	„ 114
1868	Apteryx	„ 402
1868	Ringed Seal	„ 402
1869	Hornbills	„ 142
1870	Panda	„ 769
1871	Hippopotamus	„ 255
1872	Hippopotamus	„ 819
1873	Sumatran Rhinoceros	„ 103
1874	Bornean Rhinoceros	„ 498
1877	Numida	„
1878	Anoa	„ 882
1879	Humboldt's Penguin	„ 6
1881	Darter	„ 247
1884	Hybrid Bovine Animals	„ 399
1885	Chimpanzee	„ 673
1887	Birds of Paradise	„ 392
1890	Wolves, Jackals, Dogs and Foxes	„ 46
1894	Snakes	„ 669
1897	Surinam Toad	„ 595

The above list consists of fifty-seven papers and notes on mammals and birds which contain many very valuable additions to our scientific knowledge.

GOLD WATCH AND CHAIN.

It is well known that during my father's residence in the Gardens, that her Majesty the Queen frequently applied to him for pet birds of various kinds, especially canaries, piping bullfinches, etc.; he also used to take care of them during her Majesty's absence from London and attend to them when ill at Buckingham Palace and Windsor. In recognition of these attentions her Majesty most graciously sent him the following letter:—

"*Buckingham Palace,*
"*June 4*, 1877.

"DEAR SIR,—The Queen desires me to ask you to accept of the accompanying Watch and Chain, which her Majesty desires to offer as a mark of Her appreciation of your care and skill in the treatment of Her Birds. I have great pleasure in doing it.

"Yours faithfully,
"THOS. BIDDULPH.

"A. D. Bartlett, Esq."

In 1879 my father became an Associate of the Linnean Society.

The Zoological Society of Amsterdam celebrated its jubilee in 1888, and on that occasion bestowed its honorary diploma upon my father.

I will conclude this short account of my father's life with one or two of his anecdotes.

EDWARD BARTLETT.

ANECDOTES.

THE PICKPOCKET.

A public place of resort on busy days in London is certain to attract and be infested with pickpockets. It is most unpleasant and distressing to persons who have expected to have a day's pleasure in visiting public exhibitions to find themselves all at once, not only penniless, but far from home and without friends.

Many such cases have occurred during my holding the position of Superintendent of the Zoological Society's Gardens.

It appeared to me desirable as far as possible to put up notices cautioning visitors to beware of pickpockets, as the capture of these rogues after they had committed a

robbery was always attended with much difficulty. Upon one occasion a woman, a well-known pickpocket, was captured, handed over to the police, tried, convicted and sentenced to eighteen months' imprisonment.

Soon after the expiration of this term, information was sent to me that the lady had again entered the Gardens. Her dress being described to me, I sought her out, and meeting her in the Monkey-house I recognized her, but had entirely forgotten the name by which she was previously known. As I intended that she should know that I knew who she was I walked quietly towards her and looking her full in the face, said, "Mrs. Brown, I believe?" She indignantly retorted, "No! sir, my name is not Brown." I replied, "I am sorry I have made a mistake, as I thought I knew you."

I immediately quitted the Monkey-house and went across the lawn to the Fish-house, where I found the keeper Tennant, who had been the principal witness against her at the trial at which she had been convicted. I called him on one side and told him that the woman pickpocket was in the Gardens, and that I had left her in the Monkey-house.

"You keep a look-out, and when she leaves walk up and speak to her." "Oh!" said Tennant, "what can I say to her?" "Well, anything—ask her if she is Mrs. Brown." Tennant took the hint and I saw him meet her. He spoke to her and she made a rush at him, but he escaped from her clutches, and, to my great relief, I saw her make hasty tracks to the exit gate, through which she passed in a great hurry, after having paid a shilling without any return for her money.

I have never heard of her reappearance in the Gardens since.

LAPLANDERS AND REINDEER.

A few years ago a party of Laplanders visited this country bringing with them a herd of reindeer, and these animals were for some time deposited in the Zoological Gardens. I had the pleasure frequently of going round with these people, who appeared to have some vague notion of Noah and the Ark, and who seemed to me to believe that the collection of animals was the same as that which had been landed from the Ark. Whether they were poking fun at me or whether they entertained the idea that I was the original Noah, I cannot say, but anyhow they always asked for Mr. Noah to go round with them, and continued during the whole time of their visit to call me by that name. This reminds me of a former visit paid me by a party of New Zealanders, whose great anxiety was to see the dove that flew from the Ark, and they were only satisfied when I pointed out to them a very beautiful white dove. Very possibly on their return to their own country they impressed on their fellow-countrymen the fact that they had seen the dove that flew out of the Ark.

THE SULTAN'S VISIT TO THE GARDENS.

Suddenly and unexpectedly, rushing through the rain and mud, arrived at the gates two outriders to announce the approach of the Sultan. I was in the Gardens, but not to be found at the moment of the Sultan's arrival. I, however, soon heard that he was already inside, and, advancing, I met the Hon. Charles Liddel, who at once introduced me to Mr. Moore of the Turkish Embassy and others, who in turn introduced me to the Sultan. The four principal attendants kept at a considerable distance, two

in advance and two behind the Sultan, Mr. Moore and myself being in the centre with the Sultan. As we passed the aviaries, pheasantries and other cages, I explained their contents, which the Sultan from time to time stopped to admire and to listen to what was said respecting them. His Majesty was evidently much struck by the appearance and performance of the *Sea-bear;* and the keeper, Lecomte, as usual, did his best to render this part of the exhibition as complete as possible; the stay at this spot was of considerable duration, and the Sultan expressed himself as highly delighted. The zebras next seemed to please him much; passing from this house he came upon the large carnivora and the keeper, Cocksedge, who took considerable pains to display the lions and tigers.

THE GREAT LOBSTER.

I remember the following good story of my old and much-esteemed friend, Mr. Adolph Franks, senior, a zoological merchant of Amsterdam. Franks and I used to do a large amount of zoological business with all the museums throughout Europe. He used to come to England to purchase large collections of dead animals, skeletons, birds, reptiles, fishes, etc. After transacting a large lot of business with Jamrach and myself one day, he proposed that we should go to the theatre in the evening; well, having enjoyed the evening at the theatre and before parting he made us join him in a big supper in Oxford Street. Franks was always mad (when he came to London) on lobsters for supper, so he went into the restaurant and looked at the lobsters, which were rather small. He then seized the waiter and dragged him outside, and in bad English mixed with Dutch told the frightened man, in an excited state of mind, that he wanted a lobster as big as

the zinc one which was hanging over the door outside. The poor waiter was doubled up with laughter, at which Franks got in a rage, but he was obliged to content himself after all with the miniature lobsters.

A GHOST-LIKE STORY.

This is how it happened. Returning late one evening from town, after all the family had gone to bed, and finding everything quiet, I retired to my downy couch. How long I had been asleep I am unable to say, but I can call to mind a frightful noise that caused me to leave my bed and listen. I very distinctly heard footsteps with a rustling sound, something like moving paper, in the passage below. Opening my bedroom door I went to the head of the stairs, and asked "Who's there?" Receiving no answer, while at the same time I could still hear the soft footsteps, I returned to my room, lighted a candle and charged my revolver. The thought now came, Can it be one of the family walking in his or her sleep? Before, however, I had time to determine what to do, I heard the rustling, together with the footsteps, coming up-stairs.

My determination what to do at that moment is rather difficult to describe, but I kept perfectly quiet and listened in great anxiety, as the object slowly walked up the passage rustling against the door and wainscot. I was now perfectly certain that whatever it was I had a good chance of finding out. Opening the door and with light in hand I beheld at the end of the passage a large black vulture, with its enormous wings spread out, the very picture of a demon. How it came into the house was soon explained. It happened that late in the evening, after the Gardens were closed and the keepers had all left, a sailor brought the bird from on board ship squeezed into a large sack,

and it was thought advisable to relieve the bird from this miserable condition. The bird was turned out of the sack into the closet at the foot of the stairs; the door of the closet could only be securely fastened from the inside, and a chair or stool had been used to prevent the bird making its escape. This powerful creature had, however, by jumping about, forced open the door and turned over the chair; the noise of this upset, no doubt, caused me to wake up and forfeit a night's rest.

MY INTRODUCTION TO THE LATE FRANK BUCKLAND'S FATHER, THE DEAN OF WESTMINSTER.

In Buckland's *Curiosities of Natural History*, in the second series, p. 48, appears an account referring to "Billy," the Hyæna, that was sent to his father by Dr. Burchell, the great African traveller.

This animal was deposited by the Dean in the menagerie known as Exeter 'Change, and was afterwards removed with that collection to the Surrey Zoological Gardens, where it died on January 14, 1846. Upon its death I received a note from Dr. Buckland, then Dean of Westminster, requesting me to call on him. Early the following morning I proceeded to the cloisters at Westminster Abbey. I rang the bell at the small arched doorway, and the door was immediately partly opened by a young woman who asked me what I wanted. I told her I had a letter from the Dean who wished to see me, and that my name was Bartlett. The extraordinary grin on the face of the woman astonished me as she opened the door wide enough to admit me, and, grinning in the most extraordinary manner, pointed to an object on the floor of the hall, apparently a man on his knees cleaning out what I afterwards understood to be a Dr. Arnit's stove. To my

great astonishment, upon my name being announced, the individual rose from his dirty, warm job, and delivering a somewhat heated rebuke to the maidservant for her neglect in allowing the ashes and rubbish to collect in the stove and causing the smoke to nearly suffocate everybody in the house, at the same time handing over the brush and dustpan to the grinning servant, bid me follow him. It was quite as much as I could do to prevent my features indicating the amusement the Dean's face caused me. Upon entering the adjoining room, however, the Dean caught a glimpse of his face in the looking-glass, for had it not been for his dress he would have had all the appearance of an ordinary chimney-sweep, and he himself could not help laughing and explaining to me the difficulties we all have with neglectful and careless servants, which had caused him to take the trouble to clean out the collected rubbish from this stove and lecture the woman with a caution that she must not give him any further trouble in this matter. He then gave me a note to Professor Owen, and requested me to go to the College of Surgeons in Lincoln's Inn Fields and carefully remove the skin of the hyæna and mount it for him without injuring the soft parts or the skeleton, which he intended to present to the College. With the assistance of Professor Owen and some of the students I carried out the Dean's instructions.

THE LATE FRANK BUCKLAND.

Of all the persons I have ever met or associated with, I know of none who possessed a more amiable, good-tempered and kinder disposition than the late Frank Buckland. Of this I had many opportunities of judging, having on several occasions accompanied him on his duties of Inspector of Salmon Fisheries. At times when most

people would have been provoked and enraged at meeting with circumstances most annoying to them, he would endeavour to suppress his anger and to do his utmost to set disagreeable matters right. I can recollect an instance which happened. On calling upon him one morning I found him somewhat upset, and, on inquiring what was the matter, he told me that he was angry; on making further inquiries as to the cause, he explained to me that the "Missis" would insist upon letting her pet monkey out of his cage, and that, in his absence, the brute had upset all his papers, had been tearing up his letters, had turned over the ink, and had done so much mischief that he was quite at a loss to know what to do. He appealed to me for advice. I felt he had placed me in some little difficulty, while he was looking anxiously for me to advise him. I suggested that he should have a large cage in the middle of his room in which he could lock himself and his papers, and when he left he could leave his papers in safety, then the monkey could have the run of the house without giving him any annoyance. I need hardly say that I left him in a much better humour than I had found him.

From time to time various mishaps would take place. Upon one occasion a monstrous lobster was forwarded to his house at the time he was away inspecting salmon rivers. Mrs. Buckland, not wishing this fine lobster to be spoiled by keeping, kindly invited a few friends to supper. Master Lobster was duly cracked up, and so far disposed of. On Buckland's return he inquired for the lobster, a letter having been forwarded to him requesting that the shell might be carefully prepared and saved. His dismay may be imagined upon hearing how it had been disposed of, but with a hearty laugh, he had the dust-heap searched, and every fragment of the lobster-shell carefully collected,

which he very cleverly put together, making a very fair specimen of this crustacea.

Numerous instances could be related as to how easily he overcame matters of this kind by the power he had of controlling his feelings under circumstances that would have produced in many persons an amount of ungovernable anger.

Buckland's house in Albany Street was noted, not only for its inhabitants and contents, but also for the vast assemblage of remarkable people who were to be met there from time to time. Being, myself, a frequent visitor, I encountered many extraordinary people—giants, dwarfs, and natives from all parts of the world. On a special occasion, I accompanied to his house a number of natives from New Zealand, who were much interested while listening to Buckland's explanations of the many wonderful things from different parts of the world in his collection, when suddenly these people appeared panic-stricken, and rushing to the window at the back of the house they leapt out, apparently in great fright. The cause of this stampede was easily explained. Buckland had opened a box containing a number of live snakes, the sight of which so terrified them that they endeavoured to escape from the house. In all probability they had never before seen a living snake, as there are no snakes of any kind to be found in New Zealand.

BUCKLAND'S BEAR AT OXFORD.

I must plead guilty to the crime of having supplied the late Frank Buckland with the bear that led him into so many scrapes during the time he was a student at Oxford. At the time he first had the bear it was extremely small, certainly not larger than a full-grown rabbit, and was, as

usual, a most amusing and interesting little pet, being made welcome by all who met with it; but, as is customary with all bears, as it increased in size and strength it became a troublesome and vexatious annoyance, and after many unruly antics, especially one mentioned in Buckland's life, Buckland's father, the Dean of Westminster, came to me in a rather furious state of mind, in consequence of the behaviour above-mentioned, and informed me that he had written to Frank, and that he or the bear, or both, must come at once to London, and that in all probability the bear would be sent to me immediately. This accordingly was done, and I placed the bear in the Gardens, but the changed conditions appeared to have such a depressing effect upon the animal that he fretted and died shortly after his arrival.

MRS. FRANK BUCKLAND.

I have mentioned several anecdotes about the late Frank Buckland, and I should now like to relate one concerning his wife, Mrs. Frank Buckland. Upon one occasion meeting my friend, Frank Buckland, at Great Yarmouth, our party consisting of three or four mutual friends, Mrs. Buckland being one of them, the conversation turned on the subject of the destruction of under-sized crabs which were exposed for sale in large quantities, and it was decided by Frank Buckland that he would, as Inspector, go round the town in the morning in order to summon the various dealers for exhibiting for sale the undersized crabs. Mrs. Buckland, having overheard what proceedings were about to be taken, determined, no doubt with her usual kindness of heart, to prevent these poor people, if possible, from being thus distressed; she therefore rose early in the morning, went round to the market-place and cautioned

the dealers, telling them that Frank Buckland would, in all probability, pay them a visit of inspection. It is needless to add that when he paid his contemplated visits he found that all the undersized crabs had disappeared, at which of course he was very much pleased, and made a great boast as to how well the *standing order* had been obeyed; but, however, you can well imagine the mirth of Frank Buckland and the rest of us when, at the breakfast-table, Mrs. Buckland informed us how she had risen early and forestalled all her husband's intentions.

PORTRAIT OF A. D. BARTLETT. ABOUT FEBRUARY, 1891.
(*An excellent likeness.*)

WILD ANIMALS IN CAPTIVITY

BY A. D. BARTLETT.

WHAT IS A DOMESTICATED ANIMAL?

THE question has often been asked, What constitutes the difference between wild and domestic animals? The domestic animals in this country consist of the following species: Horses, asses, mules, different breeds of cattle, sheep, goats, pigs, dogs, cats, rabbits, and guinea-pigs. These animals are associated and under the control and protection of mankind, some of them living in our houses, our stables, and our farms. They live, as a rule, in harmony with each other; they can be trusted together, and may be regarded as a happy family. The origin of most of them is so remote, that it is found impossible to say at what period they were domesticated, or satisfactorily to point out their wild progenitors. This is particularly the case with the horse, the sheep, the goat, and the pig. The varieties of all these animals are most remarkable, differing, as they do, in size, form, and colour. Unlike wild animals, these creatures vary to such an extent in their colour, markings, and the mixture of colour. This is exemplified in the most striking manner by the colour of horses, cattle, goats, and pigs, black, white, and reddish-brown appearing in various forms; sometimes the three colours appearing mixed upon an individual, at other

times they are found either black, white, or reddish-brown. This variation of colour, in most or all of our domestic breeds, is a strong contrast with the uniform colours of most wild animals. Many years since attempts have been made to introduce and domesticate various species of wild animals. Up to the present time these attempts have ended in failures. Without further argument, let us suppose that we obtain the young of any wild species which are easily reared by hand, and become perfectly tame as pets, we find they invariably are liable, if of a timid nature, to become alarmed and wild; on the other hand, if of a savage nature, they become dangerous and unmanageable. It appears impossible to so overcome their natural habits as to introduce them as associates of man with domestic animals. This is particularly noticeable in all the deer and antelope species, and other vegetable feeders. It is still more unlikely to succeed with flesh-eating animals. However tame they may be reared, at any moment their natural habit, as they attain maturity, would render them unsafe to be associated with man or other animals; they would become the terror of all living creatures, the danger of their savage nature being developed at any moment. In the foregoing list the elephant, the camel, and the ferret have not been included, as they appear on the borders, as it were, of domestic animals in this country; these may be regarded as semi-domesticated. It is true the ferret has been regarded for many generations as a domestic animal, at the same time it has always been found unsafe to allow this blood-thirsty little beast to have its liberty. Numerous instances of its savage nature are well known; the cry of an infant is sufficient to excite its thirst for blood. A very striking instance of this is well recorded in Bell's *British Quadrupeds*, page 163.

The foregoing remarks are confined to mammals; and a

few words upon the subject of domestic birds may be worth notice. In this country we have but few species that may be regarded as domesticated. They consist of various breeds of ducks, geese, fowls, turkeys, pigeons, doves, and a few small birds. Swans have not been included, although they breed freely in captivity; nevertheless they have undergone no marked variety, they retain their wild disposition and habits, and unless they are pinioned or their wings mutilated they are liable to fly from captivity; hence it appears they retain sufficient of their original wild habits as to place them on the border or margin of domestication.

LIONS AND TIGERS.

A CHANGE OF RESIDENCE

Upon the completion of the building of the present Lion-house I was tormented by applications made to me by friends and Fellows of the Society wishing to be informed when the lions and tigers were to be removed to the new house. Numerous suggestions and ridiculous propositions for carrying out this interesting and dangerous performance were put forward. Some people advised that the animals should be chloroformed, others that chains and spring collars should be used, which, with a sufficient number of men on either side, would be the most simple and easy mode of transport, while one other suggestion was that an iron tunnel should be erected for them to run through.

In order to put a stop to this annoyance I had to assure my numerous correspondents that nothing would be seen by outsiders of the removal of the animals, as it was quite uncertain at what hour they could be shifted and it was quite impossible to say when they would be. The mode of proceeding was, however, extremely simple. There was placed in front of the door of the cage of the lion or tiger that was about to be removed a narrow shifting or travelling den; no attempt was made to force or drive the animal into this den, the door of which was open facing the open door of the old cage. The animal was

CUTTING LION'S CLAWS.

To face p. 27.

tempted to enter the shifting den by his food being offered to him at the far end, but as it was uncertain how long it would take to induce the beast to venture into the temporary den, the men who were employed to carry out the removal were not kept waiting until the animal thought proper to do so, but went about their work. When the beast had made up his mind and walked into the travelling cage the keeper in attendance closed the door immediately behind him and the bell in the clock-tower was rung as the signal to the other men that the animal had been trapped. The men at once knew that they were required to convey the captured animal to his new home.

Although this was a somewhat slow process the whole collection was removed without the slightest damage being done either to the animals or to the persons employed in the undertaking.

CUTTING THE CLAWS OF LIONS AND TIGERS.

The claws of all the cat species continue to grow during the life of the animal, and it is only by their continual use that they are worn down, otherwise they grow in the form of a circle and the joints enter the pad under the toe of the beast, thereby producing lameness. As a rule all domestic cats use their claws frequently, to the disfigurement of the household furniture; the legs of tables, if of soft wood, are objects often selected. In order to prevent lions, tigers, and other members of the feline class from suffering by the growth of the claws the dens are supplied with trunks of trees upon which they generally amuse themselves, and therefore keep their toe-nails in proper condition.

Sometimes, however, it is found that they have neglected

to use these trees, consequently the claws have grown into the pads, and unless they are cut off the animal will become hopelessly lame and suffer a great amount of torture.

It is no child's play to perform the operation of cutting off the talons, for, in the first place, the creature makes all the resistance possible in his power, and, by reason of his great strength and activity, is not a little dangerous. The keepers endeavour to catch both front feet of the animal in straps that have a slip-knot; the tighter it is pulled the more firmly the foot can be held, and then drawn forward between the bars of the cage. The operator, armed with a pair of sharp cutting nippers, accomplishes the operation and gives the relief required. In performing this operation there is a risk of the animal, when so treated, biting the iron bars and to thus endanger the breaking of his teeth. In order to prevent this biting occurring one of the attendants is provided with a long pole or bar of wood which he thrusts in front of the animal's mouth, so that he may fix his teeth into the wood and thus prevent them being broken. If the same animal has been operated upon two or three times, although a year may have elapsed between each operation, I have found that the beast offers less resistance each time; I think that probably the creature becomes accustomed to the operation, and, moreover, I think the brute knows it to be done for his benefit and relief.

The skin of a lion or tiger is so tough that the claws are sometimes either broken off when fighting or completely torn out.

EXTRACTING BONE FROM TEETH.

Not very long since one of the keepers came to me and informed me that one of the lions seemed very uncomfortable and was trying to get something out of his mouth with his paw. I went over to the Lion-house and, upon examination, found that a bone had become fixed in the mouth of one of the animals. He was becoming very disagreeable, and the difficulty was, how it was to be extracted. I had him removed into one of the shifting dens, where he would not be far from the bars. I then discovered that the substance in his mouth was a large porous bone as large as a man's fist, and which formed the hip-joint of a horse. The lion had had his usual dinner of horseflesh, and had somehow or other forced one of his upper canine teeth into the soft spongy piece of bone; on closing his mouth he had pressed the corresponding canine tooth through as well, so that the teeth met in the centre and had become a fixture, thus preventing him from taking either food or water. With a great deal of difficulty I managed, with a pair of blacksmith's tongs, to get this bone out of the beast's mouth, and fortunately no injury happened to the animal or to any one concerned in the operation.

KILLED BY A LION.

An announcement with the above heading is calculated to attract attention, for so much has been written and said in praise of this powerful brute, of his noble disposition, and his respect and forbearance towards mankind, that many persons are deluded into a belief that a lion is less to be feared than any of the other large carnivora, and

one of the most telling exhibitions that have from time to time appeared before the public consists of performing lions and their tamers.

The end of almost the whole of the persons who have engaged in these dangerous exhibitions is, that they have been maimed for life or killed outright.

The attempt of the lion Wallace in 1881 to kill the under-keeper, and his later attempt, which occurred soon afterwards, and in which he nearly succeeded, to kill the man Alicamousa, are examples of all former experiences in cases of this kind, and may be expected to occur again and again so long as this sort of exhibition is permitted to take place. There are several reasons for the unexpected and sudden display of the brutal ferocity of animals of this class. Some of the causes are not known or can be suspected by the persons engaged in this very hazardous pursuit. There are times that certain excitement renders animals (that at other times are tame and gentle) almost mad with rage. A few similar instances illustrative of this subject will at once become apparent to all persons who keep pets, or who are acquainted with animals. There are few persons who keep dogs that do not know at certain times the males surround the house in which a female of the species is kept, and the determined perseverance to remain in the neighbourhood, in spite of all the thrashing they may have received or be threatened with. Now, in case of a lion or other powerful carnivorous animal under the same circumstances, the creature is beyond all control.

There is another danger that attends the performance that is unforeseen and rarely thought of by the public, and still more rarely mentioned by the friends of the man who has lost his life; for it is very natural to find an ordinary crowd, delighted at the exhibition of courage and daring, wishing not only to shake hands with the lion-tamer, but

inviting him to a friendly glass. This is one of the fatal mistakes of the lion king, who, being excited by his success and promptitude to excel, presses too strongly, and with foolhardy determination, to compel the animals he believes he has overawed to do more than usual, and the termination of his performance is partial destruction, very often leading to death. It is not difficult to see and fully understand that any animal who has the power, when overflogged or unmercifully chastised, will oftentimes turn upon the tormentor; and many instances are well known of large dogs, when beaten unfairly by their masters, having turned upon them. Moreover, there are many instances recorded of keepers of hounds, when in a state of intoxication, having been attacked by the pack, the man being so unlike himself (when sober), he being so completely altered they do not recognize him evidently, and they all fall upon him as a stranger.

The conclusion arrived at is simple enough. That the strength of a man as compared with any of the larger carnivora is infinitesimally small; and if, therefore, the animal is angered, a hand-to-hand combat must, as it invariably does, mean either death or mutilation to the performer.

BREEDING LIONS.

Notice has frequently been called to the fact that lions are so constantly bred and reared in the various travelling menageries under what most persons consider great difficulties and disadvantages.

It must be borne in mind however that the circumstances under which they exist are most favourable to them, as they are constantly being roused and moved about from place to place, sometimes with a reduced

quantity of food, until the courage and temper of the animals become perfectly African. The natural instincts and power being thus developed, the animals are far more healthy and vigorous than the fat, well-fed, lazy, sleepy occupants of the dens in the London Zoological Gardens. The travelling showman is delighted, upon arriving at a quiet country town or village, to startle the inhabitants by the loud, angry and hungry roaring of his lions, which has far greater influence and service as an advertisement than the best band of music; in fact, the roaring of the lions, when they thunder forth, is called the menagerie music, and the band that accompanies the caravan is looked upon as quite of secondary importance. The more aristocratic lions in the Regent's Park are too well behaved to disturb the peace of that highly respectable locality, and therefore are seldom heard to give vent to their feelings in the same manner as their plebeian brothers.

The proprietor of a well-known travelling menagerie stated that, on one occasion, the largest male lion in his collection escaped, during the night, through a hole he made in the bottom of his den. He went prowling about in the dark, and first came upon a man whose duty was that of watchman. This individual was quietly napping on a bundle of hay in a corner of the booth, and was made conscious of the proximity of danger by the lion sniffing and smelling at his mouth, so fearfully close, that the watchman could distinctly feel the hot breath of the lion on his face. With great self-command and wonderful presence of mind he remained perfectly motionless during this trying moment, the fear of death so close at hand causing his breath almost to cease, as had he moved or startled he would have, in all probability, lost his life. He was, however, relieved at hearing his unwelcome midnight visitor slowly walk away and make off in the

darkness. An alarm was soon given, and all hands, keepers, helpers, grooms, and musicians, summoned to receive instructions from their able and energetic director. It was some time before his gracious majesty was discovered; the first information received of his whereabouts was at break of day, when he was seen on a common near by, slowly following a flock of tame geese, and soon afterwards he appeared in full form, with head erect, looking majestically grand, and carrying in his mouth a fine full-grown goose, his having which was a very fortunate incident, as it enabled the keepers to approach him, upon seeing whom he squatted down determined to retain his prize. The keepers taking advantage of this circumstance secured and, by skilful management, conveyed him in safety to another and a stronger den, "probably a wiser and a sadder lion."

TIGER IN BOW STREET POLICE COURT AS HUMAN REMAINS.

During my residence in Little Russell Street, Covent Garden, I received a dead, full-grown tiger, from a menagerie. Being anxious to preserve the skeleton as well as the skin, I had the whole of the flesh carefully removed from the bones, leaving the vertebræ and ribs in their entirety. I then had this portion (the skeleton) of the tiger conveyed to the top of the house, and, in order to secure it, it was made fast by a cord to the chimney-stack. It had been there some time; during which the cord must have perished, because one stormy night this skeleton was blown from the roof into the street below. The next morning, to my great astonishment, I found that my presence was required at Bow Street Police Station, on the supposition that some horrid crime had been com-

mitted, and that the skeleton, which had fallen from the roof of my house into the street, was that of some human being and had been conveyed to the nearest police station. It turned out to be my tiger skeleton, but I found it necessary to have the bones of the head, legs and tail carried to the station in order to enable the surgeon, who had been sent for to examine the portions of the skeleton, to certify that they were not "human remains."

THE SERVAL.

The serval (*Felis serval*) is one of the forms of the Felidæ, and appears to unite the characteristics of the lynx and cheetah. In the form of the limbs, and the colour and marking, as well as the texture of the coat, it closely approaches the cheetah (*Felis jubata*); and in shape of the body and shortness of its tail, together with the somewhat erect and rather pointed ears, it represents the family of the lynx. It, however, requires a very little consideration to discover the number of resemblances among this beautiful order, as, for instance, the Persian lynx resembles the puma of America as much in colour as the serval does the cheetah. Thus we have the serval with its spotted coat and short tail side by side with the Persian lynx in its plain dress.

Throughout the whole group of the Felidæ there is so little variance in the structure of the animals, that, divested of their skins, the most learned anatomist would be much perplexed to find characters to distinguish one species from another, except by the size; and in the case of animals like the lion and tiger, it is only possible by a very slight difference in the skull to distinguish these two well-marked species, the skins of which present so great a contrast.

The skins of the large cats, such as the leopards of the old world and the jaguars of America, are distinct enough

to be easily known and recognized by persons accustomed to examine them, although they are spotted and coloured somewhat alike. In the smaller kinds, such as the serval, lynx, ocelots, and many of the smaller tiger cats, the skins are the only means of determining the species, as the skeletons present such a marked uniformity that it is impossible to distinguish one species from another, the size in so many instances varying greatly in the same species, causing much confusion and difficulty of identification. For instance, the leopards of India and the adjacent islands and the leopards of Africa are allowed by the best modern authorities to be only one species; although they differ much in size and colour in different localities, and are known by various local names, such as cheetah, tiger, panther or leopard. On account of the great variation so frequently discerned in the colour or marking, little or no specific value is attached to it. In some instances, however, the size and form of the spots or markings on either side of the same animal differ considerably. In all the larger species the young are striped or spotted, the young of the lion and puma exhibiting these markings for several months after birth.

WOLVES AND JACKALS.

The fact that all the wonderful breeds or races of dogs are the descendants of wolves or jackals, or a mixture of both, cannot offer a doubt, as I see no other way of accounting for their existence. The gradual and easy manner with which they appear to glide downward is, I think, sufficient reason for us to believe that in the lapse of time the extraordinary changes we now find may have, under the variable conditions of life, been brought about.

Of the common wolf, the pups, if taken soon after birth and tenderly reared, are as tame and playful as puppies of any breed of dogs, and may, up to full growth, be trusted as harmless companions. After this time, however, it may happen (which is almost a certainty) that they forget the kind treatment they have received and suddenly take advantage of an opportunity to gain their liberty and pursue a life of freedom, no longer to be under the control of their master. There are several breeds of dogs that appear to differ but little from the wolf. The Esquimaux dog, for instance, seems to be a domesticated Arctic wolf. We have also dogs from the Mackenzie River, North America; from Africa, China, Australia, and different parts of Europe, all nearly allied in form, habits, and other particulars, until we gradually, and by many stages, descend into the most extraordinary varieties, viz. pugs, poodles, spaniels, greyhounds, terriers, mastiffs, bloodhounds, and others in endless mixtures, which are no doubt produced

by selection and careful breeding. (It is said that if a fox-terrier were stretched out similarly to pulling out a piece of indiarubber, all over his body, legs, head and all, he could be turned into a greyhound. It is well known that no fox-terrier is thoroughbred without greyhound blood in him.) I may, however, from the opportunities I have had of observing so many living examples of the above-named animals, be able to offer a few remarks upon the subject.

In the first place, I find that wolves differ greatly in size, colour, and markings. Wolves from the Arctic regions are larger, lighter in colour, and have a much longer and thicker coat than those inhabiting milder climates; and it appears to me that many of the varieties from different parts of the world have been considered as distinct species, without sufficient characters to mark their distinction. With regard to the jackals, they are more readily distinguishable, and several well-marked species are known and recognized.

I now come to the dog. The origin of the extraordinary number of *breeds* of dogs, the astonishing variety of size, form, colour, etc., render any attempt to account for their origin a task of much difficulty, but, as most wild dogs appear to be descendants of domestic dogs which have become wild, it is necessary to endeavour to account for the origin of the domestic race.

There can be no doubt that the Esquimaux dogs are reclaimed or domesticated wolves. All wolves if taken young and reared by man are tame, playful, and exhibit a friendship for those who feed and attend to them; the same may be said of all the species of jackals. This being so, it is highly probable that both wolves and jackals were constantly found in the company of man, and, by this association, they may have become mixed. A mixed

breed would at once develop a new variety; a variety once commenced would in many generations undergo many changes, especially if any very well-marked variety should occur; this would naturally lead to the possessors endeavouring to perpetuate and increase the variety, more especially if it were found to be of a useful quality. I have found no difficulty in crossing wolves or jackals with dogs when suitably matched, but have failed to breed between dogs and foxes, notwithstanding that numerous specimens have been from time to time brought to my notice of the so-called cross; but I have never met with one well-authenticated instance of a *hybrid dog and fox*.

The habits of wolves and jackals are so much alike that I am unable to point out any peculiarity or marked differences. In domestic dogs many of the habits of wolves and jackals are frequently exhibited—the scratching up the ground with the front feet, and with the hind feet covering up the droppings, by the backward motion of the hind feet. The turning round two or three times before lying down is intended no doubt to form a hollow in the ground to rest upon; these peculiarities may be noticed in pet dogs about to rest upon the hearth-rug. The whining, growling, and howling of wolves, jackals, and dogs are so alike as to be undistinguishable, but the barking is undoubtedly an acquired habit, and doubtless due to domestication. Wolves and jackals in a wild state never bark, neither do Esquimaux dogs nor dingos; nevertheless, if kept associated with barking dogs, they in many instances acquire the habit.

A well-authenticated instance came under my observation. A wild Antarctic wolf, after it had been in the Gardens a few months, heard the barking of dogs in the immediate neighbourhood, and the animal began to bark,

in which it succeeded admirably; the same thing has happened with pure-bred Esquimaux dogs.

This reminds me of another instance of the development of the voice by domestication, in the fact that no wild jungle fowl ever utters the fine loud crow of our domestic cock, the origin of which, there can be no doubt, was the jungle fowl of India.

There are several species of wild dogs, such as the Cape hunting dog (*Lycaon pictus*), the Bush dog (*Icticyon venaticus*), the Red wolf (*Canis jubatus*), and *Canis primævus;* but I do not consider any of the foregoing in any way connected with the breeds of our domestic races or varieties; at the same time, I may venture to suggest that animals may have existed who contributed to the production of some of the varieties of our domestic dogs and who have been absorbed or become extinct.

The different breeds of dogs do not afford a greater difficulty in accounting for their existence than is offered by the different breeds of pigeons, or the extraordinary varieties of breeds of domestic poultry.

The male wolf, when confined with the female who has young, appears to take an active share in rearing the young ones. It has been found that directly the young wolves begin to run about, the male, soon after feeding, casts up from his stomach a considerable portion of his half-digested meal, which the cubs eagerly devour. It is remarkable to find that, upon the male being removed from the female and young, the female immediately commences to do the same thing, namely, cast up a large portion of her half-digested food for the cubs.

You may take two of the most remarkable breeds of domestic dogs, as unlike each other as possible, and by crossing them the probability is that the mongrel offspring will resemble the dingo character, or what they

call the pariah dogs, a mongrel breed in which the well-developed choice-bred character is wholly lost.

There was deposited in the Gardens some time ago a fine, large, common European wolf, reared by hand, which remained perfectly harmless and tame when full-grown. It lived in the house with its master and followed him about the country like a dog. Upon one occasion, when the animal was out with its owner, it caught sight of a child, running; which it at once made after, and, in all probability, had it overtaken the child, the wolf would probably have seriously injured it. The owner thought it prudent not to run this risk again, so it was presented to the Society.

THE AARD WOLF.

(*PROTELES LALANDI.*)

A fine example of this animal arrived on the evening of October 26, 1868, the first of the species seen here alive, and certainly a rare and difficult one to obtain. It being late, it was determined to let him remain for the night in the box in which he had travelled from South Africa. In order that he should have something to eat, a fresh-killed pigeon was thrown while still warm into his cage. The next morning the beast was removed to the house inhabited by the Civet cats; this might seem a little out of place for an animal said to smell most offensively, but by some writers the *Proteles* is thought to be nearly allied to the Civets; this therefore appeared to be the most suitable locality for his accommodation, near his relations, to blend disgusting odours with highly-prized perfumes. After removal from the box it was found that he had not eaten the pigeon, and for two or more days refused all the food offered him. On making inquiries of

the person who had had charge of the animal on the voyage it was found that the beast had fed on the offal of sheep, etc. Fearing the animal would die, bread and milk was placed in his cage, and the keeper reported that he partook of this food. Feeling confident that his appetite would soon come round I left for the continent, and on returning ten days after the animal had been in the Gardens I found that he had not taken any food whatever during my absence. Startled at this, my first thought was that he was disgusted by the strong musky perfume of his neighbours, and, calling to mind the story of the nightman, who was seized with a fainting sensation when passing Rimmel's, I determined to have him removed at once to another house and take charge of him myself. He was accordingly placed in a large den, his only companions consisting of large tortoises that were brought indoors for the winter. Now he had refused pigeon, rabbit, beef, mutton, boiled and raw and chopped in a sausage-machine, and bread-and-milk; he also declined water, of which he lapped only a little, so a dead *Proteles* might be shortly expected, but not if I could help it. I had some nice fat tripe well boiled in milk; cutting up the tripe quite small I placed this tempting dish within easy reach and left him for the night. My early morning call satisfied me that *Mr. Proteles* had not touched this fresh supply for his supper. Although he had not touched the food for his supper, I called it his breakfast, and, with this thought, I sprinkled him all over with the boiled fat tripe. This interference with the gentleman's coat rather ruffled him, so he began to lick off this offending mixture, and not disliking the taste, swallowed it. At night I repeated the dose as before, and in a few days the beast became fond of the food and fed readily.

THE ESCAPE OF A BLACK WOLF.

(CANIS NIGER, SCLATER.)

My instruction to the night-watchman was, "never to ring the house-bell during the night," because it not only aroused all the family, but, if it rang, they at once knew that something was wrong. If, however, he had occasion to call me, he was to throw a handful of gravel at my bedroom window and I would at once attend to him.

Accordingly one dark night the gravel striking the glass of my window caused me to look out. "A black wolf is loose in the garden," said one of the keepers. "I will be with you directly," was my reply. I was not long finding sufficient clothing for the hunt.

I found upon inquiry that the wolf had crouched in a corner near the Polar bear's den. By turning on the watchman's bull's-eye lantern we soon caught sight of him, his bright eyes looking with a green glare at the light. "Keep the light full in his face," was my order to the watchman, "and come slowly forward. I will creep sideways up to him, and, if I can get hold of him, I think we can manage him." While he was staring at the light I seized him by the neck, my two assistants at once came to my help, and with but little difficulty we safely caged him for the night.

ELEPHANTS.

My first experience with elephants commenced in Exeter 'Change, in the Strand, where, as I have before stated, I became acquainted with Mr. Cross, the then proprietor of the menagerie. I well remember the killing of the elephant Chunie in 1826, as I was present on that occasion.

Being so young I was much alarmed, more on account of the fury of the charges he made on the front of the den than at the firing of the soldiers. The great fear expressed by all present was that he would break out, as had he done so the whole floor of the building would have given way under his weight and he would have landed in the Bazaar in the Strand beneath.

In 1847 the large male elephant, Jack, died in the Zoological Gardens. I was sent for to skin and prepare the skeleton of this huge animal. Professor Owen, Professor Rymer Jones and other anatomists were present on the occasion, taking notes and assisting in the dissection. By the accidental breaking of the tackle used in lifting the body of this ponderous brute I was nearly crushed to death, and Professor Owen, while endeavouring to remove the brain, so lacerated his hands against the ragged edge of the skull-bones that an alarming and dangerous illness was the result; in fact, it was thought for some time that his life was in danger. Since this event I have had considerable experience in skinning and preparing large animals. The various proprietors of menageries would

write to me informing me of the death of any of their large animals, most of which I purchased. I also received all, or nearly all, the animals that died in the Regent's Park and in the Surrey Zoological Gardens. I thus became acquainted with the proprietors of travelling menageries, and at the same time I obtained a knowledge of all the elephants in travelling menageries in England and many on the continent, as well as those in the Zoological Gardens in various parts of Europe.

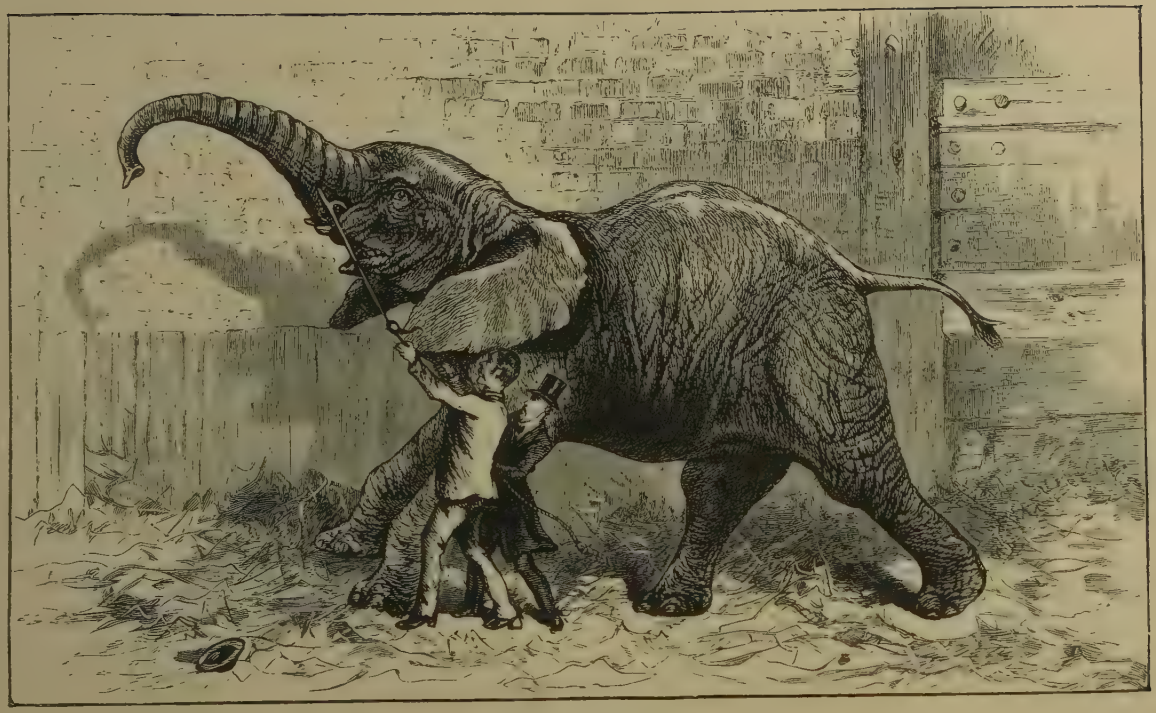
My fondness for elephants led me to study them and pay particular attention to their habits and treatment in captivity. I found that the males when approaching maturity, or when about twenty years of age, required very careful management, for about this period, if well fed and in good condition, they become restless and somewhat uncertain in temper, and in many instances extremely dangerous to be approached. This condition generally would last four or five weeks, and is well known to elephant-keepers by the term "must." I heard of the deaths of many persons who had been killed from time to time by elephants while in this state.

The first elephant that ever came immediately under my charge was the celebrated "Jumbo."

The African elephant "Jumbo" was received in exchange for other animals on June 26, 1865.

At that date he was about 4 ft. high and he was in a filthy and miserable condition. I handed him over to Matthew Scott, who I thought was the most likely man to attend to my instructions because he had no previous experience in the treatment and management of elephants. The first thing was to endeavour to remove the accumulated filth and dirt from his skin. This was a task requiring a considerable amount of labour and patience, and was not to be done in the space of a moment. The poor beast's feet for

want of attention had grown out of shape, but by scraping and rasping, together with a supply of good and nourishing food, his condition rapidly improved. He soon, however, became very frolicsome and began to play up some very lively tricks, so much so that we found it necessary to put a stop to his gambols, and this we accomplished in a very speedy and effectual manner. Scott and myself, holding him by each ear, administered to him a good thrashing. He quickly recognized that he was mastered by lying down and uttering a cry of submission. We coaxed him and fed him with a few tempting morsels, and after this time he appeared to recognize that we were his best friends, and he continued on the best of terms with both of us until about the year before he was sold. He was at that time about twenty-one years old and had attained the enormous size of nearly 11 ft. in height. As I have before mentioned, all male elephants at this age and in this condition become troublesome and dangerous. "Jumbo" was no exception to this rule. He commenced to destroy the doors and other parts of his house, driving his tusks through the iron plates, splintering the timber in all directions, rendering it necessary to have the house propped up, as it still remains, with massive timber beams. When in this condition and in his house, none of the keepers except Scott dare go near him; but, strange to say, he was perfectly quiet as soon as he was allowed to be free in the Gardens. I was perfectly well aware that this restless and frantic condition could be subdued by reducing the quantity of his food, fastening his limbs by chains, and an occasional flogging; but this treatment would have called forth a multitude of protests from kind-hearted and sensitive people, and, in all probability, would have led to those concerned appearing before the magistrates at the police court charged with cruelty; and the result might



LANCING JUMBO'S FACE.

To face p. 47.

have been very unfavourable and disastrous. It is only those who have had experience in the management of an elephant who are aware that unless the person in charge of him is determined to be master and overpower him, that person will lose all control over him and will be liable at any moment to fall a victim to his enormous strength. It was during his fits of temporary insanity that "Jumbo" broke both his tusks by driving them through the iron-work of his den; the tusks were broken off within his mouth, probably close to his upper jawbone. As the tusks of elephants continue to grow throughout the whole of the animal's life, "Jumbo's" tusks accordingly grew again, pushing forward the broken jagged ends; but instead of protruding in the usual way from under the upper lip they grew somewhat upwards in his mouth and in the course of time it was observed that they were forcing their way through the skin not far below his eyes. The result of this was an abscess on each side of his face. It was evident to every one that the painful irritation caused the beast much suffering, and he fed but little and was losing flesh He was getting so weak that he appeared afraid to lie down, and had he done so it was doubtful if he would have had strength to get up again. Upon my going to him he would allow me to put my hand upon these swellings, and appeared to me by the motion of his trunk to indicate the seat or cause of his suffering. I therefore determined to cut through the thick skin in order to discharge the accumulated pus and enable the tusks to grow out of this opening. In order to accomplish this I had a steel rod made about 18 in. in length, formed with a sharp hook at the end, the hook being flattened on the inner edge as sharp as a razor. With this instrument Scott, the keeper, and I entered the den, having previously fastened the doors of the house to prevent any one entering and

disturbing our proceedings, as I was fearful that the noise made by the other keepers would alarm the brute or cause him to be restless. Standing under his lower jaw and passing the instrument above the swollen part, I, with a sharp pull, hooking fast into the skin, cut it through, causing a most frightful discharge of very offensive matter; the poor beast uttered a loud shriek and rushed from us, bleeding, shaking and trembling, but without exhibiting any anger. After a little coaxing and talking to he allowed us to wash out the wound by syringing it with water. On the following morning we determined to operate upon the other abscess on the opposite side. We had, however, some misgiving as to the result of our second attempt to operate upon him, but, to our intense surprise, the beast stood perfectly still until the sudden cut caused him to start and give another cry like the one he uttered the day before. The improvement in the animal's condition after these two operations was most remarkable; the tusks soon made their appearance growing through the apertures that had been cut for the discharge of the abscesses instead of coming out under the upper lip, their ordinary, or I may say their proper, place.

But to return to "Jumbo's" early days, I may remark that he was very soon strong enough to carry children on his back, and, therefore, a new howdah was made for him. At that time all the cash handed to the keepers of the elephants by the persons who rode on them was the keepers' perquisites. How much they received from the visitors will probably never be known, but, as "Jumbo" became the great favourite, Scott came in for the lion's share. This, no doubt, was the cause of his refusing to have the assistance of any other keeper; in fact, all the keepers had a fear of him, probably not without cause.[1]

[1] Since the departure of "Jumbo," by order of the Council an

"Jumbo" had been for nearly sixteen years quiet, gentle, and tractable, and had been daily in the habit of carrying hundreds of visitors about the gardens. Finding that he, at the end of this period, was likely to do some fatal mischief I made an application to the Council to be supplied with a sufficiently powerful rifle in the event of finding it necessary to kill him. Strange to say also about this time I received a letter from the late Mr. Barnum, asking if the Society would sell the big African elephant, and, if so, at what price. I submitted Mr. Barnum's letter to the Council, and was instructed to dispose of the animal for £2000. I wrote immediately to Mr. Barnum telling him that he could have "Jumbo" for £2000 "as he stands," my object being to save the Society the expense of packing and forwarding this huge animal to America. Mr. Barnum replied by telegram—"I accept your offer; my agents will be with you in a few days."

The following appeared in the *Times*, January 25, 1882:—

"THE GREAT AFRICAN ELEPHANT.

"Barnum, the American showman, has bought for the sum of £2000, the large male African Elephant, which has for many years formed one of the principal attractions in the Gardens of the Zoological Society in the Regent's Park.

"The purchase has been made upon the understanding that the animal is to be removed and shipped to America

entirely new arrangement has been adopted, by the sale of riding tickets at 2*d*. each, the men taking a share. The result has been to produce an income to the Society of about £800 per annum.

at the risk of the purchaser. To those who know the size, weight, and strength of this ponderous creature (certainly the largest elephant in Europe), the undertaking is one of serious difficulty and not unattended with some danger."

When Elephant Bill (Newman), Mr. Barnum's man, and Mr. Barnum's agent, Mr. Davis, had, after five or six weeks, fruitlessly attempted to entice or force "Jumbo" into the travelling box, they came to me seriously about what was the best thing to do; at the same time Mr. Davis said, if the Society would undertake to safely put Jumbo on board ship, he was willing to pay £1000. This offer was declined, at the same time a promise was given to do the best to assist in carrying out the undertaking.

Very considerable alterations were then proposed to be made in the arrangements, but when the fresh plans were perfected to every one's satisfaction, it was found that a further difficulty existed; that difficulty was, it was imagined, caused by the unwillingness of Scott, the keeper, to exert himself in the command he had over the animal; in fact, it was generally suspected that he was obstructing the work of removal, and that his effort to box the elephant was a sham. This caused me to ask Newman whether if I removed Scott from the elephant-house, he would undertake the charge of the beast himself. This he at once consented to do. Having arranged this matter, I proceeded with Newman to the elephant-house, and calling Scott outside, told him that it was my intention to send him away from the Gardens for a time in order that Newman should get accustomed to the habits and management of Jumbo before he left England. At the same time I remarked to Scott that Mr. Barnum had made him a most liberal offer if he would accompany the animal to America, and that his place would be kept open for

him here should he return in a specified time. Scott immediately begged me not to carry out my intention of giving him a holiday, stating that if I would only give him another day he would do his best to induce "Jumbo" to enter his box. To this I agreed, and on the following morning "Jumbo" was safely housed.

"ALICE."

The African elephant "Alice" was purchased of the late Mr. C. Rice (who at the time had an establishment in St. George's Street, E.) for the sum of £500. At that time she was under 4 ft. in height. She was very tractable. So small was she that it was suggested that she should be put in a cab and taken to the Gardens. Being anxious to remove her that same afternoon I determined to walk her through the streets. This I managed in spite of the trouble and annoyance caused by a crowd of two to three hundred of the London mob, composed as a London mob usually is of a lot of dirty, ragged, noisy boys, and not a few of that nomad, the London rough, the curse to modern travellers about town. Notwithstanding these difficulties I reached the Gardens just as it was dark. Finding my dinner awaiting me, I introduced my companion "Alice," who seated herself by my side at the table and evidently enjoyed the bread, apples, etc., with which I supplied her.

ACCIDENT TO "ALICE."

One morning about nine o'clock in the month of August, Waterman, one of the keepers, came to me in breathless haste asking me to come to the elephant-house, at the same time saying that "Alice," the female African

elephant, had torn off part of her trunk. I went of course immediately and found the end of her trunk lying in the middle of the den. Scott and one of the other keepers handed it to me at my request. It was warm and the nerves and muscles were still quivering and in motion; it gave me a most painful shock. The poor beast appeared in great distress and agony, whirling and elevating her trunk and screaming; she would not allow any one near her. I ordered the tank in the house to be filled with cold water, and a tarpaulin to be hung up in front of the den. I was sadly afraid I should have to destroy the poor creature and made the necessary preparation for an emergency; however, I found, after visiting her from time to time, that the bleeding had stopped and that she had availed herself of the cold water into which to thrust the ragged end of the torn trunk.

When the painful excitement had partially worn off I weighed and measured the portion of the torn-off trunk. In weight it was 2 lbs. 2 ozs., and on the longest side measured 12 in.; it however shrank considerably when placed in a glass jar containing strong spirits of wine.

The constant and kind attention to the poor creature by the keepers convinced me that she would not die for want of food, as she allowed the men to put biscuits into her mouth, and by placing the indiarubber hose to her mouth she could take water.

As the jagged end of the trunk had ceased bleeding, and the animal had become quiet, I had great hopes of saving her life. Of course it was quite impossible to say what would happen. It might not heal, it might ulcerate and decay and rot off, and then it would be necessary to put an end to her sufferings.

At all events, I considered that all the symptoms were

in favour of her recovery, and I should not for one moment listen to the idea of, or consent to, her destruction.

I was much gratified to find that the wound was gradually healing up, and continued to do so until it was perfectly sound, and the animal afterwards used her trunk for all needful purposes nearly as well as the uninjured beasts.

DEAD ELEPHANTS.

Having witnessed the manner in which Professer Owen had failed to remove the brain caused me to determine, should another opportunity occur, to try if I could succeed in taking out in a perfect state the brain of an elephant. The opportunity soon presented itself: a large elephant having died at the Surrey Zoological Gardens, it was offered to me for a very considerable sum of money. I bought the animal upon the condition that no one should be allowed to enter the house where my assistants and I were at work. I was successful in removing the brain in the best condition, and having deposited it carefully in a large pan filled with spirits I opened the door to a number of medical students and others who had been very clamorous for admission. The first thing they were most anxious to have was the brain for the Museum of the Royal College of Lincoln's Inn Fields; they also eagerly seized upon the heart, kidneys, etc., in fact nearly the whole of the viscera, which they carried off to the College of Surgeons. I informed them at the time that I had paid a large sum for the dead elephant, and whatever they removed must be paid for. To this their answer was "there would be no objection."

I had some little difficulty with the Secretary of the

College of Surgeons, but I afterwards received a cheque for the sum of £25 for the soft parts of this elephant. Another rather amusing occurrence took place in regard to this animal. After the skin and bones had been removed there remained a large quantity of flesh of which it appeared to me somewhat difficult to dispose. At this moment a cat's-meat man made his appearance and offered to remove it. I felt a little in doubt whether he would carry out his offer, and to make sure I asked him if he would give me a sovereign for it, which he readily did and at once carted it away.

Some time afterwards I met him and asked him how he got on with the elephant meat. His answer was, "Oh, pretty well at first, but there was too much of it, and I was obliged to salt it, and then I found I should lose my customers, for the old ladies told me the cats would not eat it. I said there was nothing wrong with it, they could smell it and it looked very nice; but none of them offered to taste it, or they would have found out how salt it was, and this was no doubt the cause of the cats declining to eat it."

The death of my third elephant occurred after I was appointed taxidermist of the Crystal Palace Company. This animal belonged to a travelling menagerie and died miles from London. With the assistance of my friend, the late Charles Jamrach, I secured the dead body of this animal, and it was conveyed to London by railway on a low trolley. I was much amused on going to the railway goods-station to find the officials very obliging and condescending, offering every possible assistance and agreeing to everything I proposed. The cause of this was, I found afterwards, due to these people having mistaken my friend Jamrach for Prince Albert. I might say that it was well known to all persons acquainted with my

German friend that, whenever he appeared in public, his display of jewellery was most imposing; this fact, coupled with his having been mistaken by the railway officials for Prince Albert, resulted in the kind assistance rendered by them.

While I was making arrangements to convey this dead elephant to Norwood a gentleman residing in Camden Town introduced himself to me and offered to allow me the use of his large garden in which I could skin and cut up the dead elephant, upon the understanding that he should have the flesh as he had a large number of big dogs that he could feed with it. I readily accepted his kind offer, and accordingly the elephant on the trolley was drawn up to the gates at the back of his house. Unfortunately, however, the trolley was too wide to be drawn into the garden, consequently my assistants and I had to skin and cut up the animal in the presence of the crowd of two or three hundred people. The skin which I had taken to Sydenham I afterwards mounted, and it was exhibited for some years in a hunting scene in the Crystal Palace, but as this stuffed specimen was surrounded with growing plants, which were constantly being watered, the saturation and moisture destroyed it and consequently resulted in its removal from the building.

THE SICK ELEPHANT AT THE ZOOLOGICAL GARDENS, CLIFTON, NEAR BRISTOL.

A fine female elephant in the above-mentioned Gardens was for some long time suffering from lameness; she was fast losing flesh, and was showing every symptom of gradual decay.

The veterinary surgeon and other authorities had come to the conclusion that the cause was some disease in the feet of the animal, and various remedies had been tried without success.

An Indian officer who had been accustomed to the management of elephants had failed, after resorting to various plans and remedies, to relieve or abate the increase of the irritating and distressing symptoms.

The Directors of the Society wrote a request that I should visit their Gardens with the view of asking and taking my opinion and advice as to what could be done for the poor animal.

I need not say I accepted the invitation, and on my arrival at the Gardens I was met by the President and other officers and conducted to the house in which the animal was confined. The place was so dark that I found it impossible to make any careful examination of the animal's feet. I therefore requested the keeper to lead the animal out into the open air; the poor beast managed to walk with much difficulty and evidently in pain. Upon raising and examining the soles of the feet I at once plainly saw what was the cause of the mischief. Turning to the keeper, I asked if there were any rats in the elephant-house. "Yes," said he, "they are swarming!" Addressing the Directors, I said, "Gentlemen, it is rats that are eating your elephant, the holes and teeth-marks resemble the teeth-marks made by rats in old cheese." After advising what was to be done to immediately stay further injury I advised that a new house should be erected. My advice was taken into consideration and agreed to, the elephant soon recovered her health, and, for all I know, the animal is alive and well in the house built for her safe keeping.

The fine female Indian elephant which had for several

years carried the children on her back about the Gardens was, in the month of July 1855, terrified at a thunder-storm. The fright brought on an attack of diarrhœa which terminated her existence on July 17. The animal was in good condition but without fat.

Having removed the skin and the limbs from the body I was enabled to ascertain the entire weight of the animal as follows:—

	lbs.
Skin	683
Stomach and intestines	543
Heart	25
Kidneys	16
Spleen	9
Lungs	107
Flesh and bones	3642
Blood and other fluids	200
	5225 lbs., or Tons 2 cwts. 6 qrs. 2 lbs. 17

FOOD, GROWTH, ETC., OF ELEPHANTS.

My experience with regard to the growth of both the African and the Indian elephant in captivity induces me to believe that their fine condition and rapid growth in captivity is accounted for by the favourable circumstances under which they are constantly kept—well supplied with the best of food, consisting of meadow hay, straw, boiled rice, biscuits, mangel-wurzel, bread and green food, with addition of the enormous quantity of buns, biscuits, etc., given to them by the thousands of visitors, coupled with the care bestowed upon them in being provided with a bath, together with the constant scrubbing and cleaning of their skins, besides being sheltered in warm houses. Surprise has often been expressed by persons well acquainted with

the Indian elephant at the rapid growth of the pair now in the Gardens, presented to the Society by H.R.H. the Prince of Wales in 1876. The male now approaches the size of the much-famed "Jumbo."

When the late Sultan of Zanzibar with Sir John Kirk visited the Zoological Gardens "Jumbo" was as usual carrying a crowd of children on his howdah, and the animal passed our party within a few feet. The Sultan expressed his astonishment at an African elephant of such size being apparently so gentle and manageable. He had never before been so near a living elephant, and his inquiry was "why were they not utilized in his own country?" I am not aware what reply he received, but I thought there might be a chance of his interesting himself in the subject. In my opinion this matter should be taken up in earnest, as there is no doubt, as I have shown, that the African elephant, although of a restless disposition, could be made available for use if proper means were taken to reduce him to servitude. This I have repeatedly advocated in various ways in my published accounts in several journals, and I hope the opportunity will not be neglected until it is too late; the destruction of this grand animal is proceeding at a rate that will before many years have passed lead to its entire extermination.

My father continues:—The elephant is not only the largest and strongest, but the most remarkable of terrestrial animals. The readiness to submit to its captors, its obedience and willingness to perform the work assigned to it by its master may be attributed to its intelligence or to the want of intelligence, a subject frequently debated. No one acquainted with elephants can have any doubt but that the elephant possesses a vast amount of intelligence, at the same time it seems very extraordinary that a brute of its size and strength should so readily submit to the

order and control of a creature so much his inferior in size and strength as a human being.

At the present time the most cruel and wonton destruction of these wonderful animals is being carried out in Africa instead of capturing, taming, and training them to work as carriers, and by these means reduce the necessity of employing slave-labour; ten pack elephants would carry merchandise equal to three hundred native carriers. If Africa is to become a civilized country the sooner this subject is taken up the better, before it is too late. It was said and thought that the African elephant could not be tamed and that the animal would not live in captivity. All these old notions are now looked upon as fables. Numbers of African elephants have of late years been imported into Europe, among others the celebrated "Jumbo," probably the largest elephant ever seen in Europe. His docility and good temper rendered him the pet of thousands, but, like all male elephants when they are nearly full grown, "Jumbo" at a certain season and for a time became troublesome and required strict and sometimes rather severe treatment. It is well known in India and wherever elephants are kept that this is necessary, but in this country anything that could be discovered as cruel treatment would at once be taken up by persons who are perfectly ignorant of the subject, and their stupid interference would expose the people in charge of the animals to be condemned for carrying out the only means of preventing the animal doing mischief during the time the restless fit lasted.

The destruction of thousands of these valuable and useful animals for the ivory alone, ought to raise a strong protest against such cruel slaughter. There is, it is well known, a determination on the part of the *native carriers* to prevent the use of elephants as far as they have any

power, fearing that their occupation of collecting ivory would be interfered with.

One most important matter connected with the use of elephants as carriers is that their food would be found on the journey, for the vegetation on which they feed is abundant in almost every part of Africa.

HEIGHT, SIZE, AND WEIGHT OF ELEPHANTS.

The average height of a full-grown African elephant is from 11 to 12 ft. The Indian elephant is about 12 in. less. The height of an African elephant is, as a general rule, that of twice round the fore-foot when placed fairly on the ground.

I now give the relative proportions in weight, etc., of the four Indian elephants in the Gardens on May 5, 1879.

	Height	Tons.	cwt.	qrs.	lbs.
Jung Pacha	7 ft.	2	3	0	23
Suffa Culli	6 ft. 10 in.	2	2	3	11
Rustum	6 ft.	1	3	3	26
Omar	6 ft. 2 in.	1	7	1	5

On March 18, 1881, the two following were again weighed:—

	Tons.	cwt.	qrs.	lbs.
Jung Pacha	2	17	1	23
Suffa Culli	2	11	0	23

So that in twenty-two months the increase in weight of these two last-mentioned amounted to 14 cwt. 1 qr. and 8 cwt. 1 qr. 12 lbs. respectively.

I also give the weight and height of an African elephant named "Jingo." It was purchased, and is a male elephant.

	Cwts.	qrs.	lbs.
Purchased July 8, 1882; weight	7	0	4
Height, 4 ft.			
October 8, 1883, height 4 ft. 11 in.; weight ...	13	2	0
Increase in weight	6	1	24

May 5, 1879.

Tape measure once round the front foot over the toes :—

	Ft.	in.
Jung Pacha	3	8
Suffa Culli	3	8
Rustum	2	11
Omar	3	2

Before "Jumbo" left the Gardens, on March 27, 1882, his height was 11 ft.; after he left, and on March 13, 1883, he had grown 7 in., and according to Mr. H. A. Ward's statement on March 13, 1886, he was just 12 feet.

TAMING AFRICAN ELEPHANTS.

The African elephant differs, like many other African mammals, from those of Asia. Take, for instance, the different races of men in Africa as contrasted with the races of Asiatics, and you will find few of the latter bear comparison with your restless, wandering, determined Arab race; the active and determined chimpanzee of Africa as compared with the mild and inoffensive ourang of Asia. Nevertheless, upon more mature consideration, I am inclined to believe that the African elephant, if properly managed, would become quite as valuable and useful as the Indian species. The great difficulty I see is the want of appliances at starting. In the first place, the African animal has far more courage, is much quicker in its movements, and is more determined and obstinate than its Asiatic relative. The two species appear to me

to differ to so great an extent that the treatment that succeeds so well with the Asiatic species would fail with the African. My experience with the last-named species convinces me that they require a much greater amount of skill and attention than the more docile Indian species. The male African elephant we have in the Gardens, I believe, is the largest living example in Europe. He is amazingly intelligent, good-tempered, and tractable; at the same time he has given me, and every one who has had anything to do with him, constant and increasing trouble and anxiety. First his enormous strength and restless disposition, together with his determined desire to be at large, has kept us day after day constantly employed altering, repairing, and making his house strong enough to keep him in it. Now, considering the ease with which we can obtain assistance at any moment of masons, carpenters, smiths, etc., with all the required materials at hand, and still find it difficult and troublesome, it occurred to me that the natives of Africa would be a little overmatched. At the same time, we must consider that the state of the interior of Africa is now likely to undergo a great change, and if the determined, bold, and reckless slave-hunters and slave-traders will turn their attention to the capture and training of the elephant in Africa, there can be no doubt they would succeed and render the country and themselves a great and everlasting good. In conclusion, I have no doubt whatever if the proper appliances and means can be found to subdue the African elephant, he will be as tractable and useful as the Indian species.

These animals may not be as docile as Asiatic, but we must not forget that they were regularly tamed and used by the ancients. That this was the kind used by the Carthaginians is evident from the form represented on

the coins of Carthage. The disuse of taming them is only a part of the frightful decadence of North Africa since Carthaginian and Roman times. As for the negroes, the not domesticating them is, I suppose, merely because they —*i. e.* the negroes, not the poor elephants—are, and have long, if not always, been too great savages. But a systematic attempt to get it done by skilled persons brought from Asia would, I doubt not, be so successful as to confer a great blessing upon the continent. I remember, years ago, seeing a young elephant of this kind, which belonged to a travelling menagerie, led through the streets of Cardiff. It was advertised, and most justly, as a great rarity—I think as a unique specimen. I observed it as it went by with the greatest interest. That it was African and not Asiatic was evident at a glance. It seemed quite as quiet as any other elephant, and I fancy they rode it, made it perform tricks, etc., just as others are trained in such cases. My impression is that it went through the streets by itself, following its keeper, but I am not quite sure.

RHINOCEROS.

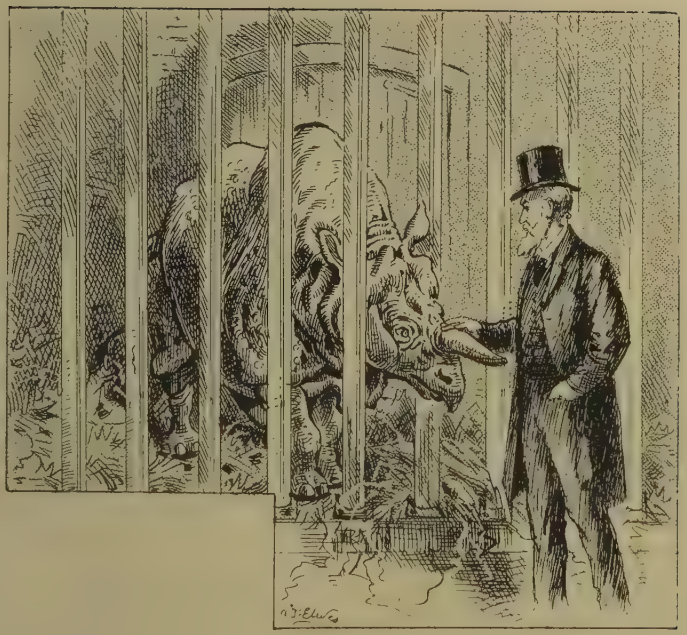
THE CHARACTER GENERALLY OF RHINOCEROSES.

When very young and small the rhinoceros is not usually bad tempered, in fact many are playful, and if a large ball or small cask were allowed it in its paddock the animal would roll and tumble it about for hours, pushing it with that part of the head where the horn would eventually be formed. Long before the beast becomes adult it is dangerous to enter the den or paddock when the animal is at liberty. It may be simply an act of playfulness on its part, but it would rush suddenly upon you and on account of its great weight and strength there would be much danger of being crushed.

Some of the species, such as *R. lasiotis* and *R. sumatrensis*, being of smaller size and less irritable, are by no means so dangerous as the one-horned *R. unicornis* of India, and the two-horned *R. bicornis* of Africa. The two latter are never to be depended upon.

The savage manner in which the Indian species will attack the bars of its den or walls of its prison, beating itself furiously against any structure and, in more than one instance, tearing off the horn and leaving the skull bare, is well known.

A large Indian rhinoceros living in the Gardens, while attempting some few years ago to tear down the iron fence, tore the horn bodily from its position on the head.



PLAYING WITH RHINOCEROS.

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The horn of the rhinoceros is of a very remarkable structure, being composed of agglutinated hair, having no bony core but growing from the skin, which is immensely thick over the nose, and when the horn was torn off it left the smooth bony portion of the nasal bones bare and fully exposed. The animal bled very much at the time, but the bone becoming thickly covered with the dried exuded blood, the place soon healed, and in the course of a few months a new horn commenced to be developed.

I may mention another instance: a female rhinoceros in her constant endeavour to tear down the iron fence caused the horn to grow forward, so as to project beyond the nose, consequently the animal had great difficulty in feeding off the ground by reason of the horn coming in contact with it first. Consequently I determined to saw it off. The animal became comparatively sociable and friendly, allowing me to rub her eyes with my hand, and at the same time I practised with a walking-stick the process of sawing the horn. This performance I continued to go through on several mornings. Finding she submitted gently to this treatment I went one morning prepared with a sharp saw, and, with the aid of one of the keepers, who smoothed her eye in order to keep it closed, I commenced to saw off the horn, which I very effectually accomplished in about ten minutes, during which time she remained perfectly quiet. I have kept this horn, and, although it has got very dry, it weighs 11 lbs., and measures 15 in. in length.

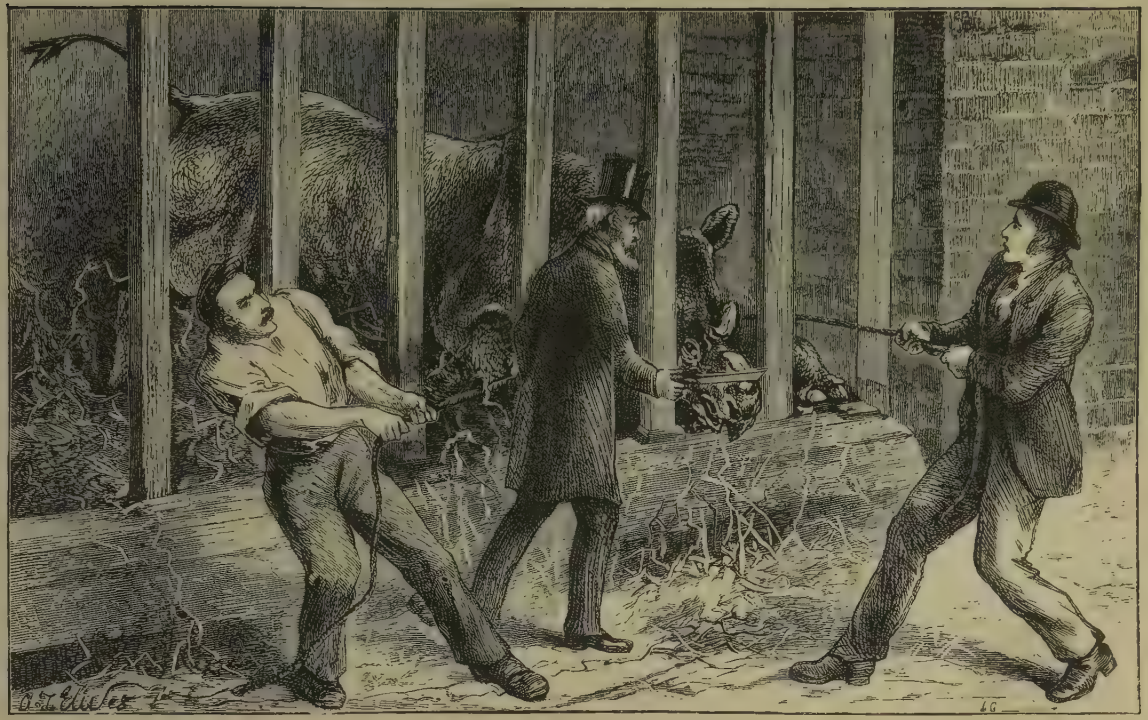
Upon another occasion the hairy-eared, two-horned rhinoceros (*R. lasiotis*), in consequence of constantly driving one of her horns against the bars of her cage, she caused it, in growing, to curve backwards until the point was in the act of forcing its way through the skin, causing it to become ulcerated. In this case I had much

greater difficulty, the brute was not to be coaxed into any kind of submission, but exhibited the most determined resistance to be touched.

I therefore arranged to make both of her front legs fast by ropes attached to the bars of the den. It was a difficult matter to commence using the saw because of her obstinate determination to resist, jerking from side to side her head which we found almost impossible to hold still. After a little while she became less violent and I commenced with the saw to cut off a portion of the horn that curved backwards. Before I had cut half way through she by a sudden jerk snapped the saw in two. Having two more saws at hand the second attempt, I thought, would be successful, but another sudden jerk broke the second saw. She now made such desperate struggles to get free, and becoming thoroughly exhausted remained quiet for a few seconds, thereby allowing me to complete the operation.

My pupil, the late Charles J. Andersson of Ngami fame, on his return from one of his hunting expeditions, told me of the danger of shooting a wild African rhinoceros. He said this ferocious beast would without any apparent provocation make furious charges at trees, rocks, or anything movable, and he, himself, narrowly escaped upon more than one occasion being killed by this powerful beast.

This ungovernable temper is exhibited also by the Indian species, which I have had the opportunity on several occasions of witnessing, tearing its horn and skin in a frightful manner. During these outbursts of temper it would be extremely dangerous for any one to dare to approach it. This furious and inexplicable behaviour has been recorded by many sportsmen who have ventured to hunt this unwieldy and powerful monster.



CUTTING HORN OFF RHINOCEROS.

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MOVING TWO RHINOCEROSES.

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REMOVING RHINOCEROS

Having resolved on a certain day in October 1865 to remove for the winter months the two young rhinoceroses to the house next to the Elands, I arranged the night before with the keepers to muster at six o'clock the following morning.

Dr. Corrigan, the Director and President of the Dublin Gardens, was in London at the time, and as he had also received a male rhinoceros, which was brought to England at the same time as our pair, he was, I knew, interested in and would like to witness any operations connected with them, in order that he might get a hint for his own future guidance. I therefore informed him that if he wished to be present at the removal I should be glad to see him.

At the appointed time all was ready. One of the animals had a strong leather collar on, the other a collar made of strong, thick, soft rope, round the neck; to these collars were tied two strong ropes, one on each side of the animal. The men were divided so as to take charge of the ropes attached to the collars, there being about twelve men to each beast, and one or two others to assist in leading, or attending to other matters, such as opening or closing gates, keeping the way clear, etc. One keeper was to lead off with a bundle of new hay on his back, in the expectation that as the brutes were hungry they would, perhaps, follow him at once. The ropes fast, the men arranged and the gates opened, the animals came out at a nice easy trot; seeing the crowd of men they suddenly turned round and plunged about. This caused a great commotion, at the same time some of the ropes getting slack became entangled with the

legs of the beasts. Knowing the danger of their being irritated and annoyed by their limbs being encumbered, I ordered the ropes to be let fall on the ground in order that they should be disengaged from their legs, then, to keep them quiet, I took a quartern loaf which had been kept in readiness, and, going between them, broke off pieces of bread and put in their mouths.

Having attracted their attention by these means, they got steady and turned round to follow me for the bread; this enabled the men to again get fairly hold of the ropes.

What had become of my friend Dr. Corrigan and the keeper with the bundle of hay during this little scramble I never heard, but certainly they were completely out of sight before we started the second time. No sooner had we started again (towards the house they were intended to pass the winter in) than I found their pace increase rapidly from a walk to a trot, from a trot to a gallop, myself taking the lead; there was no time for talking, but away we went full pelt. I was closely followed by my rough friends dragging behind them all my brave army, whose weight, strength, and determined efforts did not appear to make the least difference to the speed of these brutes, but on we went. Fortunately I had directed the gates of the yard leading to the house to be set wide open, and which had been attended to, as there was no time to knock at the door. The animals bolted in and across the yard into the house; I threw the remaining portions of the loaf on the floor and scrambled over the rails out of the way of danger; they followed close at my heels, then came to a sudden stop inside the house, and all was soon satisfactorily settled.

After the experience of the first removal of the two rhinoceroses, I thought it would be quite unsafe to again risk a run for it in taking them back to their summer

quarters; moreover the animals had much increased in size and strength during the winter months.

I therefore arranged to get them into a large den (one at a time), and draw this on a low-wheeled truck, used for this purpose, but the enormous weight of this den and the animals combined prevented this plan from being carried out. After we had succeeded in getting the beast (the male) into the den, the weight of which was over two tons (without the rhinoceros), I considered that the only way we could move it was by rollers on planks laid on the pathway, and so slide or roll it on. Owing to the slow progress we made, the day was so far advanced that, before the transfer to the summer quarters was completed, I felt convinced we should not have time to repeat the process with the other animal before dark. I was, however, in fear that the female would turn ill-tempered on account of her being left by herself, and I also had vague fears that she was able to break out of the house were she to attempt to do so.

After safely depositing the male, and having the whole staff of keepers (thirty in number) at hand, I ordered the strong leather collar and an additional rope collar to be put on the neck of the female, and with two double ropes behind and one double rope in front we started. Although we went on tolerably steady, and got safely to the end of the journey, we all felt perfectly sure, from the few pranks played by her ladyship—she had given every one his work to do—that the male would be more than all concerned would have cared to tackle in this fashion.

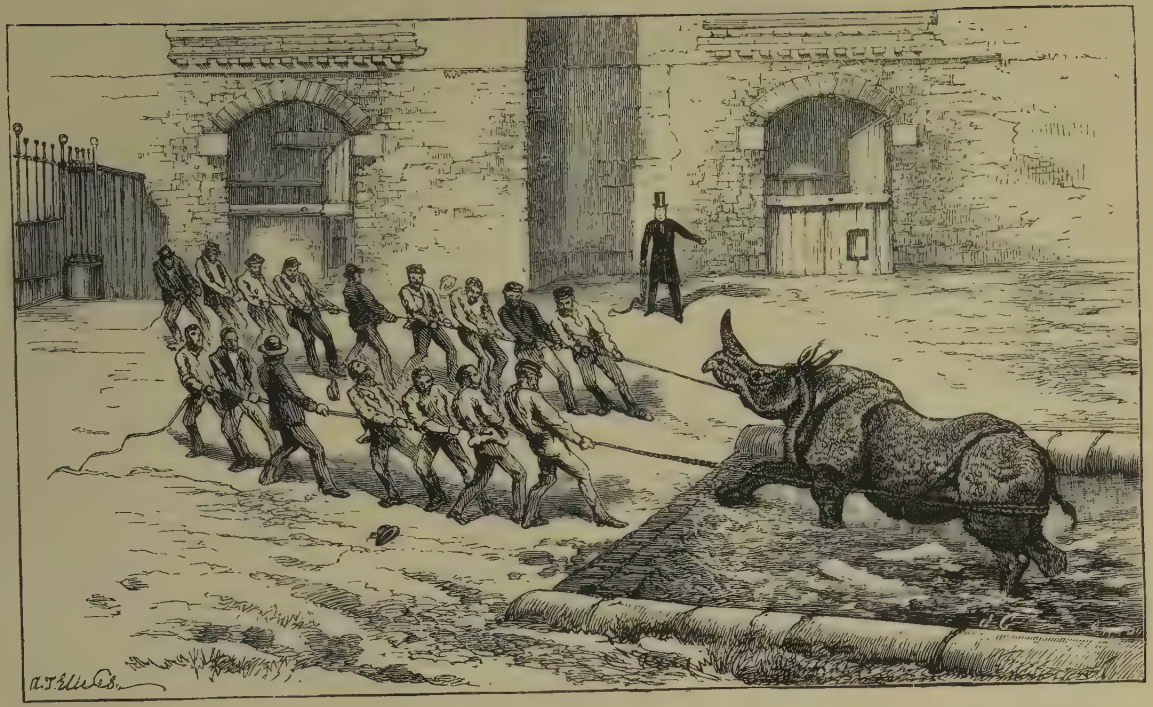
The large female Indian rhinoceros died on December 13, 1873. She was the same animal which met with the accident by falling through the ice on the pond in her paddock, and of which Mr. Buckland gave a graphic account in *Land and Water*, December 29, 1870.

He afterwards wrote:—"This animal arrived in the Gardens in 1850. It was then supposed she was about one year old, so that would make her about twenty-four years old when she died, and the fact that an Indian animal accustomed to a hot climate should live in the Regent's Park such a length of time does infinite credit to the management. Her gigantic carcass was placed on boards on rollers, and it took twenty-five men to roll it to the dissecting-house in the Gardens. The measurements of the great beast were:—Total length from tip of nose to tip of tail, 12 ft. 4 in.; circumference at widest part, 12 ft.; the weight was probably between two and three tons. By means of pulleys the huge and ponderous skin was hauled up while Mr. Gerrard separated it from the flesh. The skin was of great thickness, in some places from 2 in. to 3 in.

"This is the same rhinoceros whose horn was amputated by the Superintendent some time since, the weight of the piece weighing 11 lbs."

Mr. Buckland wrote in *Land and Water*, vol. x. p. 484, from information I gave him, an account of the strange ice accident to the rhinoceros:

"The animal had been turned out that morning as usual into the paddock behind the elephant-house while the dens were being cleaned. The snow had fallen thickly during the night, so that the pond was not to be distinguished from the ground. The rhinoceros not seeing the pond put her fore-feet on the ice, which immediately gave way, and in she went head over heels with a crash. The keepers ran for Mr. Bartlett, the resident superintendent; when he came (in a few minutes) he found the poor rhinoceros was floundering about among great sheets of ice, under which she had probably been kept down till her great strength enabled her to break up the whole



RHINOCEROS IN THE ICE.

To face p. 70.

mass. Here then was a most awkward accident under unexpected and novel circumstances, putting Mr. Bartlett's readiness of action to the test. My friend, however, with his usual courage, quickness, and readiness of resource, was quite equal to the occasion. He immediately let the water off the pond by knocking away a large plug which he has thoughtfully fixed instead of a tap, which is liable to get out of order. In the meantime the poor rhinoceros was in great danger of drowning, as the pond is 9 ft. deep, so while the pond was running off, Mr. Bartlett, losing no time, sent for all the available keepers and a long and strong rope; barrow-loads of gravel were at the same time strewed on the sloping sides of the pond, to give the exhausted animal a foothold. The rope was then tossed round the haunches of the rhinoceros, like the kicking-strap of a horse in harness, and twenty-six men, one-half at one end of the rope and the other half at the other, pulled hard on the rhinoceros, so that in her struggles to get up the bank she would not only be supported but pulled forcibly forwards. After much hauling on the part of the men and much plunging on the slippery bank of the pond, the rhinoceros was at last landed on *terra firma*. The salvors of this valuable living property had then to look out for themselves. Mr. Bartlett had anticipated this, for he had left the sliding gate of the enclosure open just wide enough to let out one man at a time, but not a rhinoceros. An absurd scene then took place, everybody rushed to the gate, but the first of the fugitives from the rhinoceros, naturally stout, and possibly stouter at Christmas time than usual, jammed fast in the open gate, so that the other twenty-five men were in the paddock with the rhinoceros. The poor frightened and half-frozen beast luckily behaved very well; she did not rush after the men, but stood still, pricked her ears and snorted, giving the

keepers time to get out as fast as they could and how they could, through the ingenious 'man-hole' or guard in the railing, made in case of emergencies. Neither the rhinoceros nor the men received the slightest injury. Shortly after the accident I saw the rhinoceros munching her breakfast as if nothing had happened. The rhinoceros was the big female; she is about 10 ft. 6 in. long and about 5 ft. high at the shoulder, and she weighs at a guess between three and four tons. The ice I found was 4 in. thick.

"I think the Society are much indebted to Mr. Bartlett for the admirable way in which he prevented what might have been a bad accident."

THE HIPPOPOTAMUS.

The first specimen of this uncouth and powerful amphibious monster was introduced into the Gardens of the Zoological Society in the year 1850. The animal was a male, and in the year 1852 a female was received. At the present time one of the young bred from this pair in 1877 is to be found in good health and fine condition among the Society's collection.

There can be no doubt as to the rapid destruction of this animal. It is easily shot, and as it lives in or near water it is much sought after. The flesh is considered good as an article of food, the hide and tusks are of considerable value, and its presence in the rivers is considered undesirable by boatmen and others. The influx of Europeans and the civilization of Africa will in a few years be the cause of the extermination of this leviathan species, which is not likely to be domesticated, or rendered serviceable to mankind, like the elephant.

The first hippopotamus, a male, that arrived in England was presented by the Viceroy of Egypt in 1850. He was quite small, in fact a baby, and was received in the Zoological Gardens accompanied by an Arab keeper named Hamet, who remained in the Gardens about a year, at the end of which time the resident keeper took charge of the beast. For the first two years the animal was quiet and good-tempered, allowing me and others to

ride on his back; however, on the last occasion on which I entered his den it was with one of my workmen who accompanied me for the purpose of assisting to take his measurements with a tape-measure. But on attempting to pass it round the animal, to take his circumference, he suddenly, and in a furious temper, turned upon us, and we had a narrow escape from his powerful jaws. My object in endeavouring to get his dimensions was to assist me in mounting the skin of the hippopotamus now in the Crystal Palace.[1] From this time no one, except his keeper, Hunt, would venture inside his den. It is also a remarkable fact that he continued to exhibit a furious antipathy towards workmen. I once saw him charge at a workman and bite the iron bars so savagely that he broke one of his enormous teeth completely off close to the jaw. A rather interesting and exciting adventure befel his keeper, Hunt, with whom he was always on the best of terms. One day, in very hot weather in the month of August, the large tank outside the hippopotamus-house had been cleaned out and refilled with fresh water. Hunt, the keeper, at the closing of the Gardens, did not, as he should have done, open the door of the den of the Hippo, but took his usual walk to a neighbouring pub to smoke his pipe and chat with a few friends. During his absence the night-watchman reported that Hunt had gone out forgetting to let the animal into the bath, and the poor beast appeared to be suffering through the heat.

The watchman was instructed to let Master Hippo into the water, which he did, and no more was thought about the matter. Later on Mr. Hunt came home (he slept in a room in Hippo's house). It was a lovely moon-

[1] The specimen mentioned above is now nearly destroyed by wet and exposure.

light night, and, knowing the bath was clean and fresh and that he had left Mr. Hippo safe in his house, he entered, by the gate, the outside yard, undressed and, taking a header into the tank, plunged under Mr. Hippo, who in turn plunged under Mr. Hunt. Plunging was the order of the day, or rather night, when one came up the other went down, no doubt both much excited and alarmed; however, fortunately, neither was hurt. Hunt, being an expert swimmer, managed to scramble out, and picking up his clothes made the best of his way to his bedroom, very unwilling that it should be known that he had had such an exciting adventure.

Of course it is well known that when a hippopotamus is resting in the water no part of him can be seen.

One morning in the summer of 1860, as I was passing through the house of the hippopotamus, Hunt, the keeper, called my attention to the restlessness of the male Hippo. The brute appeared determined to remove a block of timber that was fitted against the wall to prevent the sliding of the door. I directed him to see the carpenter, have the fastenings well looked to, and, if it were possible, to add to their security and to have it done immediately. About an hour afterwards I was engaged in my office replying to several letters that had arrived by the morning's post, when the office boy rushed into the office, his face strongly indicating the terror that was upon him; he almost convulsively shouted, "Master, master, the hippopotamus is out!" This announcement was quickly verified, for, upon looking out of my office, sure enough there was Mr. Hippo on the path opposite my house, nor did he appear to me to be in a very good temper. He was moving slowly and with cautious steps, his eyes protruding from their sockets, his head raised and his back set up. What is to be done? thought I. I

sent the office boy towards the elephant-house to tell the men to prevent any one from coming towards the beast, and, going round the back way, I saw the door of the Hippo's house wide open. While thinking how to act, I met Scott, the elephant-keeper, who was always an object of dislike to the hippopotamus, and at him the brute would always rush whenever it saw him. A thought occurred to me, and I at once decided what to do. "Scott," said I, "if you go round and call at him he will come after you, but make sure he doesn't catch you; you must run into his house and up the steps on to the platform, and we will follow up and shut the door after he gets in." Scott was delighted at the idea, and, with a broad grin upon his face, carried out my instructions with full and complete success. At that time there was a flight of steps leading to a platform over the water-tank in the house to enable the keepers to escape from the animal should the brute turn savage.[1]

DEATH OF "OBAYSCH."

This old hippopotamus came to the Gardens in May 1850 and died in March 1878. Two or three winters previous to his death "Obaysch" (from the name of the river in which he was captured) was observed to be in an unsatisfactory state of health, getting thin and emaciated.

During the summer months, when plenty of green food was at hand, and the weather warm, he got into better condition. There was no organic disease discovered when the *post-mortem* was made, and it is pretty certain that

[1] A similar account of the escape of Hippo was published in the *Life of Frank Buckland*, p. 284, by Bumpus, in which, however, there are some inaccuracies, especially about the bank-note said to have been handed to Scott.

he died from pure old age. It is quite consistent with these facts to suppose that the hippopotamus does not live to a great age, because the young animal born in the Gardens attained its full size in six years, although "Obaysch," as compared with this youngster, had not attained his full growth until he was ten years old.

"OBAYSCH" AT THE DENTIST'S.

In 1873 I gave the late Mr. Frank Buckland the following particulars for his book, *Curiosities of Natural History*, of the successful attempt of extracting the tooth of the hippopotamus "Obaysch" living in the Gardens:—

"You will be glad to know that I have succeeded in performing perhaps the largest dental operation on record. Our male hippopotamus 'Obaysch' has been suffering from a fractured tooth, and, fearing the consequences might be serious, I had a strong oak fence fixed between his pond and the iron railings, as I had determined to remove the tooth. This I accomplished, but not without a fearful struggle. I had had prepared a powerful pair of forceps more than 2 ft. long; with these I grasped his fractured incisor, thinking that, with a firm and determined twist, I should gain possession of the fine piece of ivory. This, however, was not so easily done, for the brute, astonished at my impudence, rushed back, tearing the instrument from my hands, and, looking as wild as a hippopotamus can look, charged at me just as I had recovered my forceps. I made another attempt, and this time held on long enough to cause the loose tooth to shift its position, but was again obliged to relinquish my hold. I had, however, no occasion to say 'Open your mouth,' for this he did to the fullest extent; therefore I had no

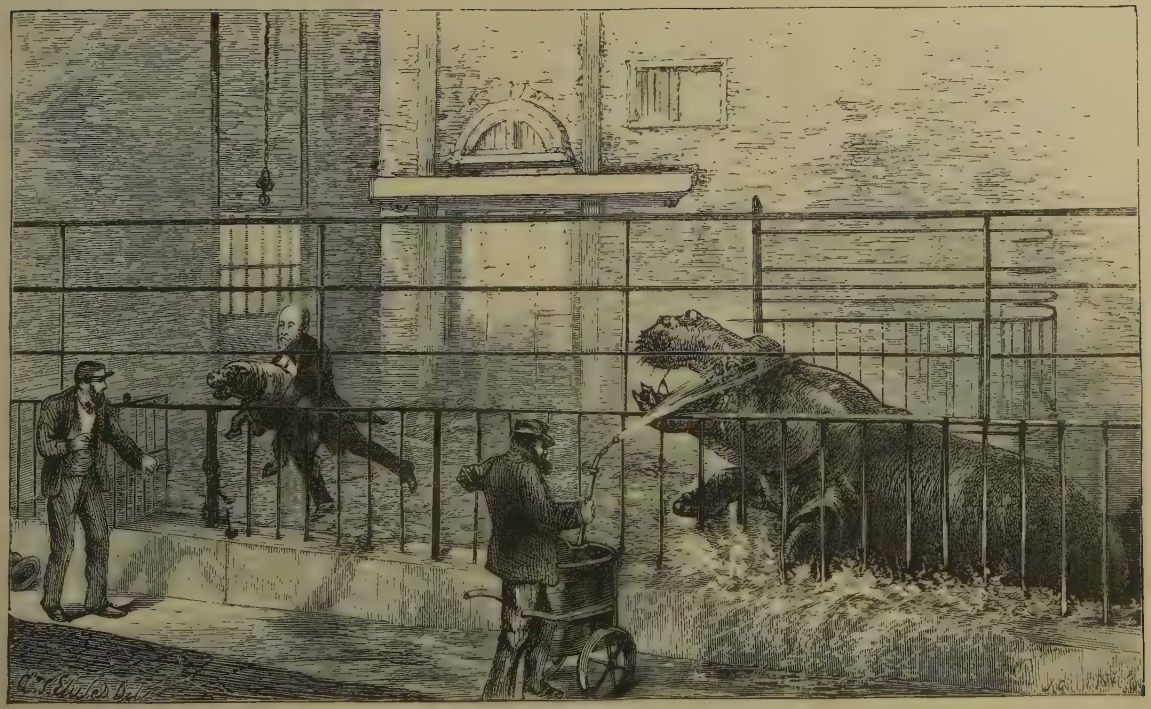
difficulty in again seizing the coveted morsel, and this time drew it forth, with a good sharp pull and a twist, out from his monstrous jaws. One of the most remarkable circumstances appeared to me to be the enormous force of the air when blown from the dilated nostrils of the great beast whilst enraged. It came against me with such a force as quite surprised me. I was equally surprised to find that the furious charge he made against the iron-barred gateway was sufficient to loosen the brickwork by which the gate was held, for had the gate at that moment fallen, I should have been crushed beneath it."

HOW TO KEEP A HIPPOPOTAMUS IN HEALTH ON A LONG JOURNEY.

That it is possible to keep a hippopotamus in health during a long journey without the trouble and expense of a huge tank (to serve as a bath) has been proved in the instance of the young animal brought to England from Egypt by Mr. Consul Petherick some few years since. The animal on its arrival was in a very rough state, the skin was dry and cracked, and portions of the epidermis were peeling off. However, in the course of a week or two, having the free use of the tank in the Zoological Society's Gardens, the skin became soft and sound, the dry parts came off freely, and the skin presented the most healthy condition.

The beast was sold and sent to America. I was consulted as to the best means of keeping the animal in good health, and also as to the least expensive mode of transport.

My advice was, not to have any water-tank, and, instead of a bath, to keep the animal moist with the aid of large



STEALING BABY HIPPO.

To face p. 79.

cloths or blankets wetted and laid on the animal, water being poured on the same as they appeared to dry.

My advice was accepted and acted upon, and with the most complete success. It has since occurred to me that a large tray might have been constructed for the animal to lie in, this tray having the edge turned up some two or three inches, so as to keep the water in. It could have been lined with an indiarubber sheet, and the beast would have enjoyed lying in this under a perfectly wet covering which would be nearly equal to a bath.

STEALING THE BABY HIPPO.

On Thursday morning following the birth of the first baby, which was apparently asleep, the mother seemed uneasy, and as the day advanced I saw the young one make a fruitless attempt to rise. Carefully noticing all the symptoms, I concluded that it was going wrong and determined, if possible, to remove it from its mother—a task of considerable difficulty, and one not altogether free from danger. The keeper, Michael Prescot, was the first to enter the house, and having the gates which lead into the tank containing the water open, he expected that he would be able to close them and keep the mother in the bath until the young one had been removed. He made the attempt, and she rushed at him and into the water; but before he could close the gates she rushed out again and stood before her young one, gnashing her teeth and threatening the keeper.

It was certain that the keepers could not remove the young one without assistance, so I sent for Arthur Thomson, the keeper, and H. North, the helper; and knowing the great dislike the female hippopotamus had

always shown towards the garden watering-engine I arranged for the keeper, Prescot, to wheel it into the house in the direction that would, if she followed it, take her into the tank or bath. In the event of her so doing Thomson was ordered to be ready to close the gates upon her, while I proposed to slip into the den and carry off the young one, North having received directions to unlock and lock the gate after me.

The attempt was made and succeeded, for as soon as the female plunged into the water to attack Prescot and the water-engine he commenced to pump the water into her face and eyes. This caused her to dive, and thus gave due time to escape before she could see what was going on.

The feat of picking up and carrying the young one was not quite so easily managed as I had anticipated. I was astonished to find that the little beast was nearly 100 lbs. in weight, and as slippery and slimy as an eel; added to this, it struggled considerably in my arms.

Placed in a warm room, on a soft bed of hay and covered with a blanket, it seemed to revive. Two goats supplied it with plenty of warm milk, which it readily sucked from a large feeding-bottle in sufficient quantity, which caused me to think that I should be able to save its life; but it died.

I will now give a few specimens of the letters I received, with hints and remarks of how I should proceed in the rearing of the young of the hippopotami. The letters speak for themselves, they require no comment from me.

No. 1.

"Sir,—It is only by mere accident, as it is called, that I saw the report of the death of the little hippopotamus.

"I beg to suggest that if the mother be still in milk—that is, if her milk be still not dried up—that you procure a small

puppy dog, say a mastiff as nearly the size and colour as her last little one; that you leave it sucking unseen by her when she is lying down, of course; if you can apply the little one to her teats, get it to suck and watch the result.

"It may be the artificial means of restoring to her her natural love and natural instinct.

"It seems worth trying; and if she should succeed in noticing it, a second might be put to her, in case the first should die of the distemper. This hint is offered in the interests of the lovers of nature. "B. S."

No. 2. "*Nov.* 7, 1872.

"SIR,—Allow me to congratulate you upon the safe arrival of 'master or miss Hippo' as the case may be, whose birth I have seen narrated in to-day's *Times*. I wish it long life and happiness on one proviso, viz. that you do not give it the name of 'Guy Fawkes,' thereby reminding your visitors and the public generally of a sad event in history, which Protestants and Catholics alike should wish to be buried in oblivion.

"Should you insist upon carrying out your proposition, I think you will rather diminish than augment the number of your visitors to those beautiful and instructive gardens, in which I and many of my friends have spent so many happy hours. I believe in making these remarks I am expressing the sentiments of a large proportion of the community whose feelings should be consulted before taking a final step.

"A VISITOR."

No. 3. "*Jan.* 11, 1872.

"SIR,—From the *Times* of yesterday I see that you made an attempt to feed the young hippopotamus with a feeding-bottle, but were not successful.

"I venture to submit that an apparatus which has been used very successfully in rearing a young camel, and frequently with goats and lambs, might be of use to you. If you think so, I could place one at your service if you will apply by post to me.

"H. S."

No. 4. "*Jan.* 13, 1872.

"DEAR SIR,—I take the liberty of addressing you in connection with the loss you have just had in the death of the little Umzivooboo.

"I have been told that the way the mother hippopotamus nurtures her child during its infancy is actually in the water. When there with the baby she manages by some mechanical process to press the milk out—the milk floats on the water, and the young one instinctively sucks it. I cannot vouch for this theory as I have never seen it done, and therefore give it to you as it was given to me, for what it is worth. "M. W."

No. 5. "*Jan.* 16, 1872.

"Sir,—In the *Daily Telegraph* report of yesterday, under the heading 'Our last Hippopotamus,' the special reporter prefaces his account of the letters of advice given you as to the proposed best methods of capturing the young calf from its powerful and watchful mother, with the following remark: 'There is a comic element in most human affairs.' Certainly the plans of chloroforming or of stupefying the dam with sulphur, which the advice given offers you, are very unique, and the wiseacres deserve a patent for stupidity; but by far the most comical seems to be the reporter's own remark that 'ass's milk was made use of to feed the young stranger with, because cow's milk was found to be *too rich*.'

"Will you kindly through advertisement in the *Telegraph* or otherwise inform the public where this London milk is to be obtained. And if you would persuade the worthy dairyman to have the walls and hoardings of London *chalked* with his address, would he not speedily realize an ample fortune?

"By the way, as you are in the secret you ought to profit by it, if only for finding him out, and you should at once enter into partnership with him, and then double and treble the present stock of cows however large that may be; and there cannot be the least doubt that you, as well as he, will soon ride in your carriages.

"Wishing for both of you your well-deserved success.

"A Lover of Good Milk."

No. 6. "*Nov.* 9, 1872.

"Sir,—At the death of the last baby hippopotamus you expressed a wish that some travellers would discover the way such animals should be treated.

"They need not travel far to discover that all animals at such a time seek seclusion.

"Had the poor hippopotamus then been left perfectly quiet,

she would soon have given her child proper nourishment. No animal would give her young 'Nature's cordial' in the excited state the poor creature must have been in, seeing her babe taken from her; no one except her keeper should have been allowed to have seen her for a week or two. In compassion for the mother and child, this time the writer hopes they will be allowed retirement. "A FRIEND TO ANIMALS."

The female, "Dil," presented by the Viceroy of Egypt in 1854, was placed with "Obaysch" in the same building. The first young one was born February 21, 1871, and died two days after its birth. She had a second young one born January 6, 1872, and which died on January 10. The third was born on November 5, 1872, and named "Guy Fawkes." For some considerable time it was uncertain of what sex this animal was, but it turned out at last to be a female. She is still living, and when a few months over five years old was as large as her mother; in fact, if it had not been for the small development of the tusks and a smaller head it would have been difficult to distinguish the mother from daughter. She eventually became a much larger animal than her mother.

CLEANING THE HIPPOPOTAMUS'S POND.

On a fine and mild morning at the end of one November I arranged to have the tank of Mrs. Hippopotamus's house emptied and cleaned, and in order to manage this it was found necessary to let her and Miss Guy out into the yard. I had successfully carried out this operation upon three previous occasions. On the first occasion the mother and young one did not notice the large tank of water, but passed the time in the yard eating the food that had been placed there to amuse them and to keep them from the water. Upon the second occasion the mother was not content to remain on land, but

becoming impatient at finding the door closed upon her, she plunged into the cold water and the baby followed her. After diving and swimming about for upwards of twenty minutes she came out of the water, the little one skipping out like a kitten.

Upon the third occasion they both took to the water, as before, and Miss Guy came out after her mother as easily as she went in. But on this morning of which I am speaking, she for some reason of her own made an attempt to quit the tank at the corner nearest the giraffe fence, and, to my alarm, failed to walk out; her increased weight had rendered it difficult for her to gain a foothold on account of the smooth and slippery state of the steps at this corner, at which she struggled for some little time.

In attempting to ascend and then slipping backward again into the water she appeared to get somewhat embarrassed and frightened; her mother fully understood that she was in trouble and at once entered the water, swimming out to her. It was exceedingly interesting to notice how she encouraged the baby and supported its head on her neck, keeping it well out of the water. After the mother had rested she came out of the pond and Guy attempted to follow her, but after another unsuccessful struggle, slipped back again into deep water. Matters now became alarming, as the poor little beast appeared to be getting exhausted with the exertions, still after another rest, as before, her mother again encouraged Guy to follow her. Unfortunately Guy was again at the same spot in the corner; however, after a most vigorous effort, she succeeded in surmounting the difficulty and placing herself on *terra firma*.

At eight months old Guy Fawkes was allowed to enter her father's den. "Obaysch" had been a resident in the Gardens for twenty-three years. On the morning of the

introduction "Obaysch" was quietly eating his breakfast of fresh grass when the sliding door of the female's den was quietly raised, and the mother and young one peered out with a most comical expression. On seeing the female the old male left off eating, and loudly trumpeted. Guy Fawkes cautiously went up to her father, and their noses all but touched, when the mother, fearing danger to the younger one, immediately rushed forward and challenged her husband. "Obaysch" retreated a little distance, while she pretended to be feeding, at the same time keeping her eyes steadfastly fixed on him.

When these animals had become excited the strange phenomenon of the "blood-sweat" appeared on their skins. The pale chocolate colour of the skin of both became densely covered with globular red spots, which looked like dew on the leaves of the trees, only in colour red, and which would leave a stain upon a handkerchief.

At last the female ("Dil," which is her name) made a rush at "Obaysch." They raised themselves on their hinder legs and, clashing their teeth together, bit and struck at each other in a most savage manner, Guy Fawkes keeping at a most respectful distance behind or at the side of her mother. When "Obaysch" and his wife got on to their fore-feet again the female, by a dexterous lunge with her head, pushed "Obaysch" into the pond, and after driving him up into a corner kept guard over him and held him a safe prisoner. While this state of things continued Guy Fawkes was safely perched on her mother's back looking impudently at her disgraced father.

Several other engagements occurred, but in the end their animosity towards each other gradually cooled down, and in a short time their differences were settled, after which they became a very happy family.

CAMELS FROM THE SOUDAN.

THE two camels were presented to the Zoological Society by John St. Aubyn, Esq., on June 6, 1884.

Having been desired to send a keeper to receive them and bring them to London, I, in accordance with this request, despatched one of the keepers to Portsmouth for that purpose. I was given to understand that the camels had been found, by a man, on the battlefields after the affair at El Teb, in a most pitiable condition. When this keeper took charge of them, the largest (the mother of the little one) was supported in slings, she not being able to stand. She was covered with sores and abscesses, having been wounded in several places; her bones were nearly through her skin, and the skin was not only destitute of hair, but was covered all over with filth and minute parasites. Notwithstanding the wretched plight of this poor animal, the keeper had her lifted and placed in a conveyance, and brought her and her poor starving calf to the Gardens. I was much shocked at the sight of them, and had not a little fear that they might introduce some disorder among our animals.

To guard against this, I had them placed in an outbuilding far away from the other camels.

Their shocking condition caused me to ask permission of the Society to have them destroyed, as an act of mercy, believing it would be charitable to put them out of their misery, for their recovery appeared to me to be hopeless.

I had the mother again supported by slings in order

that the starved calf might obtain any milk she might have left.

At the end of some days which elapsed before I received permission to have them killed, during which time every care had been taken to supply the poor creatures with the best and most suitable food, I was delighted to find so marked an improvement in both of them that I determined, if possible, to save their lives; the abscesses were lanced, the sores and wounds cleansed and dressed, and the skins washed and attended to day and night. In the course of about five weeks the mother was not only able to stand, but to walk slowly about. I then had them photographed, and from that time they continued gradually to improve, the young one more rapidly than the mother; this may naturally be attributed to its being free of abscesses and wounds. These painful and troublesome annoyances are tedious and very slowly cured. The mother, however, perfectly recovered her health, and so improved in condition that I had both her and the calf again photographed. The remarkable change in their appearance cannot be overlooked. The mother regained her hump, which had altogether disappeared when I first saw her, and her whole condition was so changed that it was with difficulty she could be recognized as the animal photographed less than a year before.

With reference to the calf, its growth was most extraordinary, encouraged by the good food and kind treatment of the keepers who attended to it. I may add that both mother and young one were, for camels, exceptionally quiet and good-tempered. I have not the slightest hesitation in saying that it is my opinion that the harsh and cruel treatment to which most camels are subjected, by their brutal drivers, renders them the troublesome and, as a rule, disagreeable creatures they are to manage.

GIRAFFES.

THE giraffes in the Gardens of the Zoological Society have done well for many years, as between twenty and thirty young ones have been born and bred on the Society's premises. Although powerful animals, they still are, as a rule, very liable to accident and sudden death. Many instances to my knowledge have occurred of the animals in various travelling menageries dying suddenly, their deaths being caused in general by their excessive timidity.

I recollect walking in a pair of soft slippers early one morning into the giraffe-house; I was astonished on my entrance to notice a sudden alarm among the giraffes. Upon my attempting to move they dashed about in such a manner that I thought they would break their necks or legs. It at once occurred to me that my moving silently along had frightened them, and in order to put a stop to their fear, I called loudly to them and stamped my feet; in this way I left the house thankful that no accident of any moment had occurred. The solution to this terrific alarm may be that giraffes, living in a country inhabited by lions, have a dread of anything that moves on the ground so silently as the much-feared lion.

A fine, healthy, lively giraffe, about eighteen months old, born in the Gardens, was observed by the keepers to be uncomfortable and, apparently, straining ineffectually to pass something. The uneasiness of the animal continued the whole day, and on the following morning I

thought it advisable to try and relieve the beast by using a mild injection. To accomplish this, five or six of the keepers entered the den in order to secure the animal for the purpose of carrying out the operation. The poor thing took fright at this unusual number of intruders, and rushed round the place once or twice so as to avoid being captured. No sooner had the men caught the giraffe than the poor beast trembled violently, drooping its head forward until it touched the ground, upon which it fell as dead as a stone.

The examination after death exhibited no sign of disease, and it was concluded that the animal had simply died of fright.

Some years since I was commissioned to purchase an adult female giraffe for the Sultan of Turkey. This I accomplished by making arrangements for one to be sent me by Mr. Hagenback of Hamburg. The animal was brought to the Gardens and remained in my possession for eight or ten days until it could be shipped for Constantinople.

By the agreement with the Turkish authorities, the animal was to be paid for before it left my possession. Fortunately for me, I received a cheque for the cost and expenses of importing the animal on Saturday. The animal up to that time appeared in the most perfect health. On the next day, Sunday, the keeper of the giraffe-house came to me about twelve o'clock to say that the beast was down on the ground and appeared unable to rise. About two p.m. the poor brute died.

The examination of the body after death failed to give any indication of disease to account for its sudden death.

One morning in the month of October, at ten o'clock, the birth of a male giraffe took place. The young animal soon after being dropped began to make efforts to gain

its legs, which seemed almost useless; it sprawled about and made many unsuccessful attempts to raise itself, rolling over and over and again struggling to rise. In about an hour afterwards, with a little assistance to steady it, it got fairly up. It stood about, and, stretching out its long neck, smelt at everything within reach; it then staggered about and soon flopped down again apparently fatigued. After resting awhile it gathered up its legs, and sitting up, looked around, and in about half-an-hour began again to attempt to stand, getting up this time unaided, but still very tottery on its feet.

The gentle and tender care exhibited by this animal towards its young deserves noting. Her constant watchfulness and kindness are to be observed for a long period after the young one's birth. I have frequently seen the mother approach the young one while it sat upon the ground, and with her long legs step over it, then, gently raising her front foot, draw it backwards in order to cause the young one to rise. Having placed herself in a position to allow it to suck, the motion of the front foot is repeated, delicately touching the young one until it rises.

In captivity this animal is generally regarded as difficult and always dangerous to keep. My experiences, however, lead me to the opposite conclusion, for since the year 1838 or 1839 to the year 1867 it has been bred and successfully reared in these Gardens. It is quite true that it is liable to accidents; its great size and stupid behaviour render it necessary to be very watchful and careful on the part of those in charge of them in order to prevent accident, for if by any possibility it can find a chance to hurt itself it appears to take advantage of it immediately, many instances of this kind having occurred. I have related a few as a means of safeguard in the future.

THE KANGAROO.

THE discovery of the kangaroo was made by Captain Cook during his first voyage in New South Wales. The wonder and astonishment of that great traveller must have been great on his beholding, for the first time, the extraordinary movements of this, to him, new animal. Its size (he met with the *Macropus giganteus*), its form and general appearance, its mode of progression, unlike that of most quadrupeds, hopping or jumping more like a large bird than moving like a mammal, would be calculated to produce, for a while, upon the observer a strange feeling of bewilderment. Notwithstanding that kangaroos are now common all over Europe, in every menagerie, in all the zoological gardens, are figured and described in books and works upon Natural History, and alluded to and talked of everywhere, yet the same strange feeling of surprise and astonishment is exhibited by every person who for the first time sees a living kangaroo; and the wonderment is greatly increased if, by chance, they see the head or legs of a young one protruding from the pouch of a female. This feeling of astonishment appears almost universal, much in the same way as the fear of snakes prevails among us, as a rule.

The cause was probably the recency of the discovery of kangaroos. People living in London, and who have the opportunity of seeing and knowing all the discoveries that

are made, soon become acquainted with the appearance of, and with many particulars connected with, new or little-known animals that are from time to time brought to this country. It is not so, however, with the vast multitude of people who live away from cities and towns, who have consequently not the opportunity of their more fortunate brethren to increase their knowledge of Natural History. Again, in the teaching of the elders of the present generation in their infancy or childhood, their fathers and grandfathers—or rather it would be better to say their mothers and grandmothers—had not seen or heard enough of the recently-discovered animals of New South Wales to be able to impart any information respecting them to their children. It is the early teaching in the nursery that prepares the mind for the things that we see in after life, and which teaching prevents the sudden expression of the emotion of alarm, of fear, of joy, etc.

After all, the teaching by the eye is beyond all doubt necessary, for however much we learn by books or words, it is unequal to that which we witness as a means to acquire knowledge.

The habits and manners of the animal which forms the subject of our paper differ so vastly from those of other quadrupeds as to make it appear not to belong to the same world. Had we not already recognized America as the new world, Australia would have well deserved the appellation, on account of the almost entire newness of all the life-forms, not only in animals but in plants. Thus may be accounted for in some measure the innumerable instances of persons who on the first occasion of seeing, at the Zoological Society's Gardens, a living kangaroo, express and display far greater amazement than at the first sight of much larger animals, such as the elephant,

rhinoceros, giraffe, etc. The newness of our acquaintance with the kangaroo and other marsupials of Australia appears to require to pass through several generations to find its way into the minds of Europeans generally, as upon a comparison of notes with our continental neighbours the same want of knowledge and surprise is noticeable in the untaught in Natural History. The excitement and curiosity evinced by most persons when they witness the young kangaroo protruding from the mother's pouch naturally leads to the question, "How it got there?" a question not yet satisfactorily answered. Long have we been trying to unravel the mystery, and some of the ablest naturalists have bestowed considerable attention upon it, and spent much valuable time with a view to solve it. It is not, however, our intention upon the present occasion to enter into that difficulty, but simply to speak of the kangaroos as we find them, low in intelligence and apparently unable to distinguish one individual from another, an instance in proof of which may be worth recording, viz. that if several females live together, the young one on leaving the pouch of its mother will take possession of the pouch of another female; thus the young ones change about, the mothers either being unable to distinguish or being quite indifferent to the rearing of their respective offspring. An analogous state of things is observable in our own species, on the part of those in the most exalted positions in society and in the highest state of civilization, and also in the lowest and most abandoned of our race.

There is nothing that indicates a lower condition of intelligence in an animal than the heedlessness or indifference shown by it in regard to the welfare of its young. Another proof of the want of intellect or power of discrimination, and of the stupidity of the kangaroo, is

the mother allowing her first young one, or any other, to continue to suck after she has again become a mother, and even the first young, after she has herself brought forth a young one, still continues to suck her mother, so that the first mother has at the same time her two offsprings suckling, although one is itself a parent, suckling her own young one.

This degraded mammal (for so its organization leads us to regard it) would doubtless prove one that might be turned to great advantage as an article of food, the flesh being excellent eating, but there are difficulties in keeping them; one which presents itself is to prevent them from wandering over the country. Our usual fences or hedges, that are quite sufficient for cattle and sheep, are perfectly useless for large kangaroos, which, at a jump or bound, would clear anything lower than six feet without the slightest trouble; once on the hop, seven or eight miles would be a mere scamper for one of these long-legged fellows, and it would be almost as difficult to catch and keep as birds that fly.

The power of leaping fences renders these animals most troublesome in the country they inhabit, because, if it suits them to visit your cultivated fields, you have no means of preventing their depredations. Many of the smaller species are now the great pest of the farmers in New South Wales, as the cultivation of the various kinds of crops prove tempting to these animals. Some of the species have multiplied to such an extent that the energies of the inhabitants are greatly tried in endeavouring to keep them down.

It becomes, however, doubtful whether they will, with the advancement of civilization, be able to resist the slaughter that is carried on against them. The larger species are already much on the decline, owing to the

spread of the cultivation and occupation of the land in Australia.

Nevertheless they are harmless and timid, unless the large old males become wounded, or are caught or interfered with; at such times they are found formidable antagonists, ripping and tearing, with the feet and claws, men or dogs.

One is tempted to regard the kangaroo as exemplifying the early transition from the bird or reptile to the more perfectly-developed mammal. Its immature birth, slow growth, and deficiency in the development of the brain; want of tenderness and care for its young; dull perception and entire lack of intelligence; its bird-like hop on its hind-legs, and its ungraceful crawl on all fours,—all place it little above the reptiles that creep and hop over the earth.

Of this form how wonderful are the modifications adapted to different kinds of life! We have a tree kangaroo (*Dendrolagus inustus*); this animal is destined to live in the forest, to climb from tree to tree and jump from branch to branch, feeding upon the leaves, flowers, tender branches, and shoots, and moving awkwardly on the ground. Have we not also one form of kangaroo that lives in the ground? Gray's Jerboa kangaroo (*Bettongia grayi*) digs a burrow like a rabbit and passes the greater part of its time there, coming out to feed only at night.

BEAVERS.

THESE industrious creatures have always attracted so much interest and attention that it is to be regretted that their numbers are so greatly diminishing, and at no distant period we fear that the species may become extinct in the new world. Although abundant enough at one time, they are now nearly or entirely extinct in Europe; their habits, mode of living, and constructing their dwellings expose them at once to the hunter, whose insatiable desire to obtain their valuable skins causes him to unnecessarily destroy a whole colony at once; this, added to the increased population and advancement of civilization, is the cause of the gradual disappearance of these intelligent constructors of dams. It must be admitted that a colony of beavers capable of bringing down several trees, each of nearly 4 ft. in circumference, during a single night and causing them to fall across a stream, and thereby diverting the current of a river, might give a considerable amount of trouble and annoyance in a well-cultivated and much-inhabited country, especially if water-mills and other useful inventions set up lower down the said river were rendered useless, and perhaps the property built on the right bank of the stream might some day be found on the left; in such a case the poor beavers would soon be called upon to account for their lawless though innocent proceedings, and no doubt, without judge or jury, would be

found guilty, condemned, and duly executed on the spot. Respecting the mode of building the dams, many of the old stories are not to be allowed credence in Practical Natural History. The supposed use of the beaver's tail has been freely descanted upon as being the means used for laying the foundation of, and plastering the mud walls. Their tails are not employed by the beavers in the Zoological Gardens to perform those offices; they, having been carefully watched in many of their most interesting movements, have been observed to use their tails only for swimming, diving, etc., etc., and not, like those spoken of in stories, for the purpose of plastering and smoothing the inner and outer sides of the walls of their dwellings, the fore-feet being found quite sufficient for those duties; therefore, whatever the beavers of old may have done, the beavers of the present day have advanced in knowledge, and discontinued the use of their tails in building their houses.

The Marquis of Hamilton (now Duke of Abercorn), who took such an active part in the Executive of the Fisheries Exhibition of 1883, before consulting me, wrote to the Marquis of Bute asking for a pair of beavers to exhibit with other animals in the Exhibition grounds. My impression, when I heard that the beavers were to be forwarded, was that the Marquis of Hamilton had been under some misapprehension, for it was not an uncommon thing for some people to think that beavers were fish-eating animals.

As the beavers were announced to be exhibited, and as a suitable place had been prepared for them, I thought the matter would pass over without comment. During the time the Exhibition was open I was solicited to write a notice of the "living animals outside the building." This I did, and the notice was published in *Land and Water*,

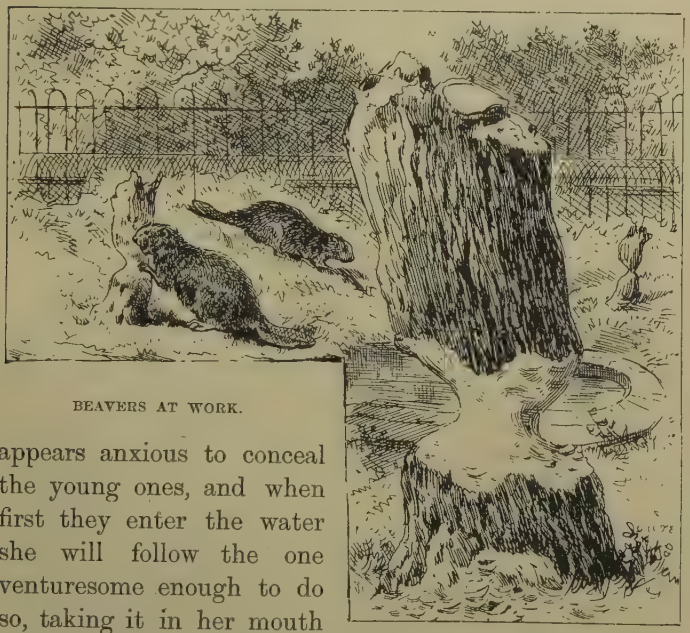
May 26, 1883. I had no difficulty in describing and talking of the birds and other animals exhibited until I came upon the beavers; here, however, I felt somewhat perplexed to find any kind of cause for the introduction of the beavers. This, however, I got over as follows:—

"It may be asked, however, by some one acquainted with the subject—What have the beavers to do with fish or fishing? as they eat not fish, but are, strictly speaking, vegetarians, feeding upon leaves, tender branches and the bark of trees, grass and roots. The answer to this inquiry may be that the beavers perform, and have performed many very important changes in the rivers in various parts of the world. Their habit of gnawing down trees, which they cause to fall across the streams they inhabit, and, like skilful engineers, dam up the rivers, and thus, by forming lakes and diverting the overflow to parts of the country previously dry, both water and fish become distributed."

The beavers have bred in the Gardens for many years, but I must confess to total ignorance as to the condition of the young at birth, nor have I been able to ascertain or find from any works on Natural History that have been within my reach a solution of the subject.

Beavers belong to the family of *Rodentia*, or gnawing animals. They may possibly produce their young in a very perfect form and condition, as many of this family do. For instance, the coypu rat, all the cavies, and the common hare produce their young in the most perfect condition, covered with fur, eyes open, feeding and running about some few hours after birth; whereas a large number of the same family, *Rodentia*, produce their young in a very imperfect state; they being naked, blind, and remaining in the nest for from fifteen to twenty days before they are able to crawl about. The common rat, mouse, rabbit and

squirrel are good examples of the latter condition at birth. With reference to the beavers, I have never ventured to disturb their nests at the time I supposed or believed they had young. When the young beavers appear out and away from the nest they are about 9 in. in length, and rather larger than a full-grown rat. The mother always



BEAVERS AT WORK.

appears anxious to conceal the young ones, and when first they enter the water she will follow the one venturesome enough to do so, taking it in her mouth and returning it to the nest. As it is repeated two or three times in the course of an hour I am not a little puzzled to know if it is the same young one on each occasion. My belief is that beavers produce two at a birth, but upon one occasion three young ones made their appearance. I cannot, however, positively say that they all belonged to the same mother. There are many people even of the present day who have

an impression that the beaver uses its tail as a plasterer does his trowel in building his dam ; this idea is entirely erroneous, the tail being used as a rudder in swimming, rising, and diving in the water, but the most extraordinary use is the warning given to the rest of the family by the loud report his broad tail makes on the surface of the water, of a supposed danger, for however many there may be about, upon this signal they all disappear under water. The sound is so remarkable, that upon a still night it could probably be heard half-a-mile away.

RODENTS.

"There be land rats, and water rats,
Water thieves, and land thieves."—*Shakespeare.*

WATER voles (*Arvicola amphibius*) are commonly called water rats. Few persons there are who are acquainted with the real water rat, although the great majority of people who reside near water speak of the water rats, and appear to know all about them; but the fact is, that the common rat is so accustomed to the water, and is so frequently seen swimming about in it, and living on the banks of streams, ponds, rivers and canals, that by far the larger number of persons who talk of water rats have never met with the true water rat, but have mistaken the common species (*Mus decumanus*) for it.

The little animal which forms the subject of this is often, through this mistaken identity, blamed for the frightful depredations which are justly to be attributed to the common rat. The true water rat is one of the least to be feared, it being extremely harmless and inoffensive, living always about the margin of water, and feeding exclusively upon vegetable substances, principally the roots of aquatic and subaquatic plants. This pretty animal much resembles the beaver in miniature. The true water rat never attains to above half the size of the adult common rat; and, moreover, is not only smaller, but has a shorter tail, and is covered with a soft velvety fur, much

resembling that of the well-known beaver. His little blunt head and small eyes do not glare like the eyes of our crafty foe.

The largest British species of *Arvicola* must not, however, be confounded with its ally *A. agrestis*, or field vole, usually named "short-tailed field mouse," the raids of which have, at times, not only caused much annoyance and alarm, but have threatened famine in consequence of their prodigious numbers, which have destroyed, wholesale, newly-sowed grain, grain in store, trees and shrubs; in fact, all vegetation, green or dried, vanished wherever they made their appearance, and this extraordinary increase of numbers is not always confined to one or two species; several kinds are known whose numbers from time to time alarm the inhabitants of the countries they visit. It may appear strange, but it is nevertheless true, that it is always the smallest creatures in the world that are most troublesome, with which it is most difficult to deal, and which produce the greatest amount of annoyance and suffering. They defy all our attempts to rid ourselves of them, and frequently drive us altogether out of their favourite localities. With all our boasted power we are helpless, or nearly so, if we are dealing with the lesser kind of mammalia in the form of rats, mice, hamster, lemming, etc. (their countless numbers completely overpowering all our endeavours to destroy them), not to mention the insect tribe in the shape of mosquitoes, tsetse flies, ants, wasps, locusts, etc., to say nothing of such as require the microscope to prove their existence; for while we can defend ourselves from and kill the larger animals whose existence appears in opposition to our welfare, we are in far greater danger when opposed by the almost invisible or microscopic enemies that are now being brought to light by the investigations that have of

late years been made into the subject of many of the frightful causes of death to our species.

The condition of the young at birth and the very remarkable difference in the number of them in different species of the *Rodentia* is unequalled in any other class of the mammalia; it will be found that the rats, mice, rabbits, and some others, produce from five to fourteen or fifteen at birth; on the other hand, the agouti, porcupine, guinea-pig, the hare, and others, only one or two at a birth. (The hare has been known to produce three, but this happens rarely.)

Some live in water and almost under water, such as beavers, water voles, etc. Others, where no water exists, of which the jerboas are a good example; many on the surface of the ground, like hares; while, probably, the larger number of species, like rabbits, marmots, porcupines, etc., live in burrows underground. Some live in trees, like squirrels. Beavers by swimming and diving; jerboas by hopping and jumping; hares by swiftly running; rabbits, marmots, and porcupines by burrowing; squirrels by rapid jumping and flying from branch to branch—show a diversity in the modes of escaping from their pursuers only equalled by the variety of kinds of food upon which they are enabled to exist.

The beavers, water voles, hares, rabbits, and others, live entirely upon vegetable substances, the porcupines and a few others upon a mixed diet of animal and vegetable products, but none can so completely give up the vegetarian diet as our common rat, who can and does so accommodate his stomach to surrounding circumstances, that he can live entirely upon flesh, fat, cheese, horns, hoofs, glue, old boots, soap, and, if nothing else can be obtained, Holloway's ointment.

The class *Rodentia*, or gnawing animals, comprises a

great genera and an endless number of species widely distributed in every part of the world. Most or all of them serve as food if not for man for other animals. No known rodent has been found unwholesome. Independently of the value of the flesh as food, their skins are of incalculable importance in our manufactures. Many species multiply so rapidly that if it were not for their numerous enemies they would probably in a short time overrun the earth and render it barely habitable.

These facts lead us to consider the great importance that should be attached to their existence, and to wonder what great end they tend to serve. However, as to most good things there are a few exceptions to be taken for our well-being, by there being too much or too many of them, so in this case is it exemplified in some parts of Australia by the introduction of rabbits in a part of the country not sufficiently populated to keep their numbers down. Great fear is entertained that they may, if not checked, cause the extinction of almost all other animals, not even sparing the sheep, by not only devouring their food but by so tainting the ground that the sheep and cattle will probably be starved or driven from places that have become infested by rabbits.

The common rat is as widely, or probably more widely, distributed than any other animal: this is not at all to be wondered at when we know that the rascal is quite at home on board ship, and is thus taken into distant countries, and is consequently found to live and thrive upon any soil and feed upon almost any kind of substance. Our common rat is certainly a fine example of an animal capable of acclimatization; he makes himself at home anywhere and everywhere, and sorely tries the patience of all that have to contend against him; the skilful and cunning devices invented, in every conceivable form, for

his destruction and extermination would fill a volume, and yet we have to continue the war against Mr. Rat, a war without end.

Many of the means adopted to reduce these pests have doubtless succeeded to a great extent, and a collection of facts upon the subject would be of considerable value, because the circumstances vary, and require accordingly a different mode of treatment, as that which answers perfectly in one place is inapplicable to another.

The patience of a Chinaman would be understood if seen watching like a cat over a rat's hole, his lantern set about a foot from the hole, and a sharp instrument like a fork held in his hand immediately over the spot, the light of the lantern being sufficient to enable the Chinaman to see the rat, who generally comes slowly out, smelling cautiously at the lantern; the sudden dart of the fork downwards upon the victim seldom fails to secure to the Celestial his dainty relish.

We shudder at the thought, simply because we have not the inclination or courage to try the flavour of a well-fed rat; those who have tried squirrels know better than to remain hungry when a well-grilled squirrel is to be met with. The common guinea-pigs are kept by the Indians of South America as pets to be eaten when other food runs short.

GROWTH OF TEETH, PARTICULARLY IN RODENTS.

The growth of the teeth in most animals is a very interesting study. In some animals the teeth continue to grow during their whole life, and this state of dentition is universal with the numerous class of *Rodentia*, most of which live upon hard and dry food, consequently the teeth

wear down, and unless they were reproduced and continually growing the animals would die from starvation.

It is not my intention to enter into the anatomical details of the very remarkable conditions and various forms of teeth structure found in the animal world, but simply to state facts, taking for example the teeth of the beaver. This rodent's food consists of the bark of trees and other vegetable substances, it will, however, sometimes gnaw bones and horns. If by accident or otherwise one of the four incisor teeth should be broken, the tooth on the opposite jaw would continue to grow, and having nothing to oppose its growth would become so elongated as to cause the animal much difficulty in obtaining food; in fact, many rodents have been found dead from this cause. I have from time to time been compelled, in order to save the lives of the animals, to capture some of the beavers in the Gardens and cut off the elongated incisor teeth.

It happens unfortunately that, in order to prevent animals of this class gnawing their way out of their enclosures and making their escape, I am obliged to employ iron, and they in attempting to bite and gnaw this metal break their teeth, consequently in course of time the opposing teeth become too long to be useful, and therefore it is found necessary to cut them shorter to make them even, so as to be used as before. This operation is by no means an easy one. In the first place, to hold an animal of this strength and form is a very difficult matter. I have found it necessary to confine the animal in a strong net, two persons being required to hold it in order to prevent it struggling. When this preliminary business is arranged, the operation is gone through. The enamel of the front of the incisor teeth is so excessively hard that it requires a very sharp three-cornered steel file to make any impression. As soon, however, as the enamel

is cut through, a small, fine-toothed steel saw is all that is necessary with which to complete the deed.

In narrating the many difficult and, at times, dangerous operations that I have attempted to perform, it may be asked (in fact, it has been asked), "Why have you risked your life, as in the case of 'Jumbo,' while you had so many people under your command?" My answer is very simple. I felt that if I were to allow another man to perform an operation which might possibly be attended with any great risk, I should, should the result be an accident to him, be looked upon as having been instrumental in contributing to the mischief. I must also be permitted to say that, when I venture on these risky undertakings, I allow no one to be with me except those whom I can with confidence trust, and whom I consider capable of performing what is required to be done.

Having some considerable knowledge of the structure of animals, I always feel that I should take the entire responsibility in a matter of this kind and chance success or failure, as the case may be.

DORMICE.

DORMICE are plentiful in Devon, and, in fact, in most of the Southern counties where there are copse-woods. They are dormant, or asleep, from four to five months in the year. Their nests are like round balls formed of sedge grass, twigs and moss, and are about the size of an average lad's fist. They are attached to twigs and low bushes about 2 ft. from the ground. If during the cold weather a nest be torn open the occupant will appear as if dead, but if put into a warm place or held in the hands it will gradually awaken and become lively.

During frost their house is entirely shut up, but if the weather be warm and plenty of sun, they resume active life. They are always great pets, but require care, as they are exceedingly delicate. Their feather-like tails are very pretty, and in many cases if held only slightly by it the whole skin will slip off, then the beauty of the little animal is spoilt; the fur never grows again, and the loss of the tail generally ends in death. Dormice should be kept very warm during the winter to prevent them from becoming dormant.

WILD SWINE.

At the present time the Zoological Society of London has in the Gardens a very fine collection of the animals of the swine family. When we consider the enormous importance of this group to man in supplying articles of food, it must be interesting to know not only how many kinds of pigs exist in the world, but also from which species the original domestic pig was derived. At the present time there are exhibited in the Society's Gardens the following species:—

Red River hog (*Potamochœrus penicillatus*).
The Southern River hog (*P. africanus*).
The Europe wild boar (*Sus scrofa*).
Indian hog (*S. cristatus*).
Javan hog (*S. vittatus*).
The wart hog of South-Eastern Africa (*Phacochœrus æthiopicus*).
The collared peccary of South America (*Dicotyles tajaçu*).

Among this group will be observed one of considerable beauty, the Red River hog (*Potamochœrus penicillatus*). This very handsome animal is remarkable for its excellent temper; upon more than one occasion the young have been received in the Superintendent's residence, and have been reared to maturity, having the run of the house. As pets they are not only quiet and good-tempered, but have

the most cleanly habits, not surpassed by those of any other pet. The Red River hog is certainly the handsomest of the group; this species is a native of Western Africa. The next species is the Southern River hog (*Potamochœrus africanus*); this animal, although not equal in its appearance to its western relative, is an extremely good-looking animal. The contrast is very great between these and one of the ugliest brutes in creation, the wart hog of South-Eastern Africa (*Phacochœrus æthiopicus*), whose frightful and ferocious face must be seen, for description would fail to give any idea of its ugliness. Between these extremes we have a number of species varying in size and appearance; probably the most marked is the common wild boar of Europe, differing but little from that of Asia. There have been also from time to time exhibited in the Gardens, Timorese swine (*Sus timorensis*) from Timor, Andaman swine (*S. andamanensis*) from the Andaman Isles, Papuan pigs (*S. papuensis*), Formosan swine (*S. taivanus*) from Formosa, white-whiskered swine (*S. leucomystax*) from Japan, pigmy hog (*Porcula salvania*) from the Western Dooars of Bhotan, the Babirussa (*Babirussa alfurus*) from Celebes, Ælian's wart hog (*Phacochœrus africanus*) from Africa, and the white-lipped peccary (*Dicotyles labiatus*) from South America.

It will be seen by the foregoing that a large portion of the world is inhabited by species of this family.

The origin of domestic pigs is, like the origin of most of our domestic animals, so obscure that it is unsafe to attempt to speculate on the subject.

In India both Brahmin and Mussulman reject the flesh of the wild boar as food. Detestation of the hog is a feeling entertained from remote antiquity. It was classed by the Jews amongst the vilest animals; and in Egypt the swineherd was numbered among the profane, and forbid-

den to enter the temples of the gods. Among the ancient Greeks and Romans, although the office of swineherd appears to be held in contempt, the flesh of the hog was in high estimation. The Chinese have no prejudice against the hog; on the contrary, they rear large numbers of these animals for the sake of their flesh. The extraordinary dispersion of these animals over the world is most wonderful. On the discovery of the South Sea Islands by Europeans they were found to be well stocked with black-legged pigs. The introduction of the small Chinese breed is one great source of improvement. The distribution in so many parts of the world of this family renders it highly probable that the domestic breeds have been derived by the admixture of one or more species. The old superstition, now so perfectly disposed of, that hybrids, the product of two species, were barren or infertile, can no longer be maintained. We thus arrive at the conclusion that the origin of the domestic pig is beyond our power of certifying.

THE JAPANESE MASKED PIG.

This remarkable animal differs so much from all the varieties of domestic pigs, that I am inclined to believe its origin must have been from some species distinct from our common stock.

The singular form of the head and face (see woodcut), together with the enormous development of skin, and the regular arrangement of the wrinkles, the large and pendulous ears, the drooping muzzle, together with its intelligent eye, give this animal a dog-like appearance; in fact, the frequency of the remark made by persons seeing these animals for the first time confirms this opinion.

Apart, however, from this, the whole structure of this

animal is well worthy of consideration: the sides of the rump, and also from the top of the shoulders downwards, are thick folds of skin, which are much harder on those parts than elsewhere, and hang about in the same position

and manner as the plates on the same parts of the Indian rhinoceros.

Having placed with the male of this animal two or three young sows of the Berkshire breed, I have succeeded in obtaining a mixed race. These half-bred pigs very closely resemble the male, being black with white feet, and exhibit the wrinkles on the face, but in a less degree.

In what way our domestic breed of pigs has been produced it is difficult to imagine. It is, however, very remarkable that in the wild boar of Europe, Africa, and Asia, the young are always striped at birth, and in no instance is this marked character found in any of our domestic breeds; but the colour and markings that appear at birth continue during life unaltered. Not so with the wild species, whose young, although striped at first, gradually lose these markings as they grow to maturity.

CHINESE PIGS.

The most difficult question to answer with reference to the subject of swine would be, "What is the origin of the domestic pig?" The early writers in Europe considered the common wild boar as the origin of the domestic race of pigs. It is very easy to understand that the pigs that were turned out and allowed to feed on uncultivated tracts and in forests did, from mixing and breeding with the wild race, assume so much of the character and form of those animals that many breeds could hardly be distinguished from them; for although the domestic pigs of some countries exhibit many marked differences, there is not the slightest doubt respecting the fact, which has been well authenticated, that the wild boar will cross with any of the domestic stock and produce fertile offspring. Now this fact is generally considered to prove that the two are only varieties of the same species. This view of the case appears to be a very questionable one, as many arguments can be advanced in opposition to that assumption, without consideration to a full knowledge of known facts that strongly prevail against such conclusions. M. Frederic Cuvier was of opinion that the Chinese pigs were derived

from a wild species distinct from the common wild boar of Europe.

Taking simply the outward form of the wild boar, its elevated shoulders, and depressed hind limbs, the body and limbs thickly and entirely clothed with the strong harsh covering of bristles and woolly hair, it is distinguishable at once from that of the really tame or domestic breed when unmixed with the wild race. Another most important character of great value to the zoologist is the condition of the young at birth. All the pure wild boars produce striped young ones. No pure domestic race or breed of pigs known to the writer produce their young so marked; when, however, a cross can be traced with the wild boar, the striped young are the result, and this may continue for many generations afterwards. It will be fair, therefore, to consider whenever a breed of pigs exhibit the striped young, that it is due to a mixture of the wild and domestic races however remote the period may have been.

That the most perfectly domestic race of pigs is obtained from the Chinese, in whose country no wild boar of the European type is to be found, there cannot be a doubt; and seeing also that whatever the colour of the domestic pigs, whether black, white, or red, or all the three colours, in no instance are the young striped like our wild species, strongly proves that they are derived from some original breed other than the true wild boar race.

It is therefore with much pleasure that we see imported from China pigs said to be perfectly wild in that country. Long since some interesting pigs were sent to England by Mr. Swinhoe, who obtained them from the savages of Formosa. They were of uniform red in colour, and the young were also uniformly coloured at birth.

These Chinese pigs are black, and have but little hair, their skins remarkably fine; the fineness of the skin and

smoothness of the hair would naturally lead us to regard them as belonging to a cultivated and carefully domesticated animal. But other members of the pig family which are freely admitted to be uncultivated are quite as remarkable for the fineness and shortness of their coats and smoothness of skin, for instance, the West African river hog (*Potamochœrus penicillatus*). No one will say that this animal's coat has been improved by cultivation and care, nor has the influence of the cold in our climate at all altered or increased its thickness, although this latter change might have been reasonably expected, seeing that the tiger when brought to Europe always wears a thicker coat in winter than ever he obtains in India.

Notwithstanding that domestic pigs have been liberated and bred wild in New Zealand and other places, and that they have assumed many of the distinctive habits and rough appearance of wild animals, yet they have not returned to the striped young, and the uniform colour of the wild boar—but are mostly black with white markings, a circumstance quite unknown among the true wild boars.

RED RIVER HOGS: 'DICK.'

Many years ago I gave the late Mr. Buckland some notes on the Red River Hog, and which have since appeared in the *Life of Frank Buckland*, by his brother-in-law, G. Bompas Eyre.

"During the winter of 1875 I received from Mr. Cross, of Liverpool, a small box about 6 in. square; upon opening the box a wee striped little pig, little bigger than a rat, put up his little snout and gave a small squeak. With the winter advancing, and knowing from his form of ears that his native home was in West Africa, I took him out and gave him a good feed of warm milk, boiled rice

and sugar, wrapped him up in flannel, and sent him back to Liverpool, with a note to say I could not purchase him, as none of the keepers would be troubled with such a baby, and I felt sure the poor little fellow would die if placed in the collection.

"A day or two afterwards I was surprised to receive the same small box, and, more so, to find the unfortunate little

RED RIVER HOG.

pig inside it, and a note from Cross to say the animal was no use to him—he could not be bothered with it,—and as I declined to purchase it for the Society he begged me to accept it, and do what I pleased with it.

"I felt hurt to find this poor little fellow thus an outcast and apparently friendless.

"I held him in my hands and took him at once into my

kitchen. Calling the maid, I asked her if she would take charge of this little outcast, telling her, at the same time, if she treated him kindly and kept him alive for one month I would give her a sovereign.

"The girl, pleased at the offer, took poor 'Dick,' for that was at once his adopted name, and placed him in a basket with a warm blanket near the fire. All went well with 'Dick' from this moment. Warm food and dainty morsels were 'Dick's' frequent allowance.

"He was soon allowed to walk about the house, and, unlike most other swine, was the cleanest of animals. Few dogs or cats could equal him in cleanliness in the house, and thus 'Dick' became a universal favourite; he, after a while, made his appearance regularly in the dining-room at dinner-time and had a plate to himself before the fire. He was the most good-tempered and well-behaved creature that can be imagined. His playfulness would sometimes frighten strangers, and as he increased rapidly in size he found it difficult to run under the chairs, and these he now and then turned over in his endeavour to rub his back or sides against them. In the early morning, before the Gardens were open to the public, 'Dick' would follow me on my rounds like a pet dog, stopping occasionally to grub up with his snout a few earthworms, of which he was very fond, and while so engaged he would lose sight of me, but the moment he did so he would rush off like a mad fellow until he overtook me; he always seemed to be in fear of being left behind.

"He was very fond of being played with, and a birch-broom afforded him great sport. When held to him he would charge at it with his tusks, small as they were at the time, and spin round in a most extraordinary way, dashing off to some distance, then returning to the charge.

"He was never tired of this sham fighting, at which he never got out of temper, for, as soon as it was over, he would come into the house as pleased as any puppy after the fun. 'Dick,' however, soon became too big for the chairs and tables, and as they were sometimes very much in his way, he turned them over, not knowing, of course, that anything of value was damaged by his so doing; in fact, it began to appear that 'Dick' had a notion that whatever was on the table was intended for him, and that the proper way to get it was to turn the table over. It was therefore decided, on July 25, 1877, that the time had arrived when 'Dick' should leave the house, and he has since formed part of the collection of the menagerie."

A WILD BOAR HUNT.

Having to shift a fine large wild boar, on account of its having a kind of mange on its skin, six or eight of the keepers were required to fix some partitions on each side of the den so as to make a passage for the brute to pass through to the other den intended for his reception. As it often occurs in matters of this kind, the arrangements were not agreeable to our bristly acquaintance, who in the most unceremonious manner made a sharp rush between the legs of some of the attendants, and, having cleared the way out, made off, for certainly the "whole hog" was soon out of sight. A hot chase commenced, and we were not long in tracing him as he dashed through the thicket (as sportsmen say), when he took to the reservoir at the upper end of the Gardens, swam across and bolted back in the most determined manner, evidently fixed on saving his bacon.

By this time lots of fellows were in pursuit, some with

nets, some with catching-bags on long poles, some with cords, others with forks, etc. By this time he was warming up, and at each attempt to stop his progress he made a charge at the individual who came the nearest. Finding it almost impossible to capture the beast without considerable trouble, and as the visitors were coming into the Gardens, and fearing that the ladies and children would be alarmed, I desired my son Edward to get his gun. Having stationed him on the top of the bank by my side, I directed the men to drive the boar towards us. As he came rushing along my son fired down upon his head, the charge taking effect and stopping his gallop; he then staggered for a second and threw himself over on his side, but he regained his legs, came over the bank and charged right and left.

By this time three or four of the men came up and tumbled him over. He fought some time longer, and, considering the injury inflicted on the skull, every one was surprised at the tenacity of life exhibited by this beast.

FOXES.

THE subject of the fox is one about which very little is generally known except by sportsmen and what is taught in fables, and probably a few remarks regarding the canine race may not be without some interest to the reader. The finding a fox is considered by many a great piece of good luck, but it does not always lead to the desired end; in one case the starting may be apparently easy, but in the run a very difficult and dangerous piece of ground has to be got over. Old-fashioned notions and prejudices are things that have produced many hard knocks and heavy falls, nevertheless those who hunt must take their chance in the field.

It is often and firmly asserted that there are strong relative connections between the fox and the dog, and the question of the so-called "fox-dog" is brought forward as an instance, gamekeepers especially being very positive that a cross can be obtained between those two animals, this supposed cross having a stronger hold on the mind of many persons than that between the hare and the rabbit. Now any one who denies the existence of an animal said to be the produce of a fox and a dog runs the risk of being, like an unfortunate fox, hunted to death. Yet that risk must be incurred. During many years of careful observations in regard to the matter, numerous specimens have been submitted to the writer's inspection by most trust-

worthy people, yet in no one instance has the fullest, most complete, and minutest investigation revealed any proof that the statement, respecting the parentage of the animal, was based upon facts.

The most foxy-looking of the specimens was considered by its owner to be undoubtedly a cross between a dog-fox and a small terrier bitch; in size it was less than a fox, being shorter in body and legs, and of a bright, sandy red; with ears erect and tail drooping, its little sharp muzzle at first reminded one of a fox, but upon the most careful comparison the result given below will be seen—in fact, only in size did this little dog differ from the dingo of Australia; it was nothing more nor less than a dwarf or bantam dingo in every particular. However much in appearance the supposed fox-dog may resemble the fox, yet when placed by the side of a veritable fox and externally compared, all the points advanced previously in its favour fall off one by one in the following order:—Eyes (pupil of): Dog—circular; fox—vertical. Nose and muzzle: Dog—rounded, and the lips thick and few whiskers; fox—sharp, and the lips thin, but the whiskers well developed. Mouth: Dog—canine teeth stout, strong, rather short, not much curved; fox—canine teeth long, slender, sharp, and much curved. No dog unless larger than a fox has the canine teeth so much developed, and the gape of the fox is wider than in the dog of about the same size. Ears: Dog—colour outside the same as the neck and back, inside thinly edged with short hair; fox—colour outside black, inside thickly fringed or coated with long and rather stiff hair, in fact the ears appear full of hair. Coat: Dog—hair somewhat stiff, harsh, short or only moderately long, and of an uniform colour to the base of the hair; no woolly undercoat; fox—hair long, points harsh, lower half soft and the base dark-coloured, a fine wool forming a thick

undercoat. Legs, feet, and toes: Dog—short, stout, and thick, blunt claws, directed downwards in the front feet; fox—slender, long, and with thin and usually sharp claws, not directed downwards, but standing forward. Tail: Dog—somewhat flattened, never reaching the ground, and terminating with a point; fox—a round woolly brush, reaching and touching the ground, and terminating with a pendulous tuft.

Not one of the fox-dogs submitted to the writer's inspection possessed a single character recorded above as belonging to the fox; it would, however, be too much to expect that a gamekeeper, who has for years cherished the belief in fox-dogs, would dispel the charm and undeceive himself, but he may some day quietly hint that, after all, the case would admit of the least possible doubt.

The slender body and limbs of a fox are undiscernible when clothed as they are by nature with the long, fine, and woolly fur; but divested of the skin, and placed by the side of an Italian greyhound, in the same condition, the fineness of the form is at once discernible, the latter (the Italian greyhound) appearing very clumsy. The comparison can be better judged by those who have seen and could look at a skinned hare and rabbit side by side, but who would probably shudder at the sight of a skinless dog or fox.

Whatever may be said about the difference existing between dogs and foxes will not hold good in reference to dogs, wolves, and jackals.

Wolves and jackals appear so alike that the only appreciable distinction is the size; and so closely do they resemble many dogs, not only in appearance but in habit, and breeding freely in captivity and producing fertile progeny, that no difficulty presents itself in regarding them as of or from one stock. The manner in which a

tame wolf or jackal will jump round his master to be caressed, wagging his tail and rolling on the ground, licking his owner's hand and foot, clearly shows that either of those animals is more closely allied to the dog than to the fox, which never, even when most tame, exhibits any of these signs.

The fox is not disposed to that kind of familiarity with our species, and is totally unsuited to be made or become a domestic animal, while, on the contrary, the dog is the most domestic animal in the world, found everywhere associated with man, and lending his skill, ingenuity, strength, and courage to his master.

There can be no doubt therefore that, whatever may have been the origin of the domestic dogs of endless variety, the fox must be regarded as a very, very distant relation, little more, in fact, than a slight acquaintance or an ally.

One thing is certain that foxes do not breed in confinement, except in rare instances; the silver fox of North America is the only species recorded to have bred in the Zoological Gardens of London, and Mr. Darwin remarks, in his *Animals and Plants under Domestication*, that he never heard of the European fox breeding in captivity.

Apart from any other consideration, a fox may be distinguished from a dog, without being seen or touched, by its smell, which on entering a house or a room in which one is kept is at once discernible; no one can produce a dog that has half the perfume of Reynard, and this perfume the fox-dog would doubtless possess were its sire a dog-fox or its dam a vixen.

A few further remarks may now be added respecting the variableness in the habits of the true fox as compared with the dog, the wolf, and the jackal. The latter animals are respectively found uniting in packs, and the meeting

of a pack of either wolves or jackals is a common and often dreaded event to the weary traveller in the countries where they abound; on the other hand, it is not on record that a pack of foxes was ever encountered; thus in this respect, a difference in disposition is at once clearly discernible. In seeking food, the fox is very crafty and sly, stealing alone upon its prey; while the dog, wolf, and jackal are more sociable, and by uniting in numbers become bold, and aid each other in attacking large game, thereby exhibiting an amount of intelligence far superior to the wily fox. The want of courage and confidence in this cunning and unsociable rascal keeps him on a level with all wild and timid animals unfitted for domestication.

Strangely do we find three colours, either distinctly or blended together, in every shade and possible variety of arrangement upon the skins of the really domestic animals, as in the dog, horse, ass, sheep, goat, oxen, camel, llama, reindeer, pig, rabbit, guinea-pig, cat, etc. Black and white, brown and white, black and brown, or all three, black, white, and brown, are found on the same animal, as in the tortoise-shell cat, rabbit, or guinea-pig; again, animals wholly black, or white, or brown are met with in the different breeds of cattle—goats, sheep, horses, rabbits, dogs, cats, pigs, etc.

CATS.

VAGRANT CATS AND DOGS.

It is no uncommon remark, that it has rained cats and dogs. But this happens, however, only occasionally about Christmas time, and then the shower has generally been confined to the stage during the performance of the pantomimes. Nevertheless, we have living amongst us a sufficient number of these useful domestic pets to produce a heavy storm of rage and fury by the terrible amount of mischief and danger met with by their increasing number, and it becomes us to draw attention to so serious a subject, in order to lessen the nuisance. In the first place, let us have some means of knowing who are the rightful owners of the animals, and we may then be able to get rid in a merciful way of the poor half-starved, un-owned, discarded creatures that infest the streets, and endanger our lives by their miserable, diseased, and vicious condition.

An increase in the amount charged as a tax on dogs would most likely cause many persons who keep dogs to conceal them, and endeavour to avoid payment, whereas the small amount of 5*s.* is not worth the risk or trouble, and would be found to produce an equal if not a larger revenue, as many would perhaps pay for two if they had them, rather than risk paying 10*s.* for one and smuggling

over the other or others. In order to ensure the fair payment, each dog should be supplied with a small stamped medal; it need not be larger than a fourpenny-piece. This must bear the Government stamp, and be affixed to the dog's collar, and any dog found without this mark should be liable to be seized by the persons appointed for this purpose. Doubtless, this law, if carried out, would quickly reduce the number of useless and dangerous dogs.

The pest of cats can be treated in a similar manner. It may appear at first much more difficult, no doubt, but, like many other newly-thought-of schemes, if fairly tried, may be found to work well after a while. It cannot be denied that the enormous number of useless and disowned cats are a most vexatious and distressing annoyance; the depredations they commit are generally at night, not only in gardens and out-buildings but in our habitations, killing and carrying off all kinds of birds, rabbits, poultry, etc., and doing much damage to our food, etc., and causing no end of trouble by stealing, and disturbing our peace by fighting and quarrelling. Now, in order to come to terms let a small tax be levied on cats, say 2*s.* 6*d.* per annum. Few are so poor that for the usefulness of a cat would object to pay that sum; and when we consider the number of houses, say in London alone, what a marvellous amount would be raised by this much-required reform. Many houses have four or five cats, and can well afford the tax, and the cats could be supplied with a small Government stamp and a receipt for the tax at the same time. There is no real difficulty in fixing a small collar upon a cat that would in no way interfere with its comfort or usefulness.

The dog and cat tax could be collected together, and would therefore involve no additional expense.

No doubt the difficulty of ascertaining the number of

cats upon any establishment would be considerable; but this is also the case with many other taxes—income tax, to wit; but in the main most of the difficulty would be with lodgers, as doubtless in a house let out in tenements a cat would most likely be found in every room. The occupiers doubtless in many cases would deny its ownership. In such case the cat must be seized, and the owner, if it had one, must claim the animal within a given time, or it would be destroyed. This would soon settle the right of cat-keeping. Cat-keeping has in some instances been carried to such an extent, that persons fond of them have been found with twenty or thirty in the same room or house, to the great discomfort of the neighbourhood. Such dens would be got rid of if such a tax were introduced.

One of the very common practices in cat-keeping is to save two or three of the kittens from every litter. These poor things are reared until they become a trouble in the house of their birth; it seems then cruel to destroy them, so they are generally taken some distance, and turned adrift to shift for themselves. They soon become alarmed and wild, and are frequently hunted by dogs, boys, and every one who raises a cry of strange cat. The poor wretch, half-starved, is at last killed in a very brutal manner, and probably the culprit arrested by the nearest beadle or constable of the Society for the Prevention of Cruelty to Animals, taken before a magistrate, and sentenced to one or two months' imprisonment for cruelty to the animal.

This part of the subject requires special attention, for the old saying that "a cat has nine lives," is founded upon ancient and well-authenticated authority, and it would be well if some of the officers and others who undertake to judge of this matter, would take the trouble to

ascertain the most humane and speedy method of killing cats, before they condemn an unfortunate amateur, who perhaps for the first time in his life, makes the attempt, and finds he has made what is considered a cruel failure, and for which he is sometimes unmercifully punished.

The wild cat (*Felis catus*) differs in many particulars from the domestic cat; at the same time, they breed freely together, and many instances are on record of fertile offspring having been produced. S. E. Pusy, Esq., has bred and successfully crossed the wild and domestic cats, several of which have been received and exhibited in the Gardens.

There is a great want of intelligence observable among the cat tribe, because, during the period that the common house cat has kittens, she does not usually know the difference between her own young or the young of either rats or squirrels, as I have seen a cat suckling both at the same time, licking and attending them as her own.

The variety of the domestic cat known as the "tortoise-shell" is, as a rule, a female, the opposite sex being represented by the black, sandy, tabby and striped cats.

Another singular variety of domestic cat is that known as the Manx or tailless cat. This variety is certainly common in the Isle of Man, but I have seen plenty of cats on the island with long tails, and many whose length of tail was intermediate, varying from 2 in. to 10 in.

I have found the temper and disposition among cats to be most variable, in fact few animals in my opinion present so many individual differences in the same species. I have no doubt that the loss of many of the lives of human beings who have been attacked by cats is attributable to the sudden impulsiveness to which all cats are liable; and it is, I consider, at all times dangerous to trust even the tamest of lions or tigers.

In illustration of this fact no better examples than that of the two or three clouded tigers that have been in the Gardens can be found. The largest male, which lived in the small mammal-house for years, was the tamest and most good-tempered of wild beasts; on the other hand, the smaller one in the lion-house was about the most ill-tempered savage that ever came into the Gardens, although he was at the time I procured him a very young animal.

APES.

NEXT in importance to the history of the human family stands that of the great apes. In consequence of their near approach, apparently, to man in their physical structure, their resemblance to him has always created a vast amount of interest, of astonishment, and of speculation in the minds of the most intelligent of those persons who have had the opportunity of observing these animals. They are regarded with more or less interest, fear, wonder, and superstition, not only among the most highly civilized of our species, but also among the natives of the countries inhabited by them.

The difficulty of obtaining reliable information, and the still greater difficulty of obtaining specimens, have hitherto prevented the true history of these strange brutes becoming known; notwithstanding this, we are gradually and certainly progressing in our knowledge of them. The travels of Mr. Wallace in Borneo brought to light much respecting the habits of the great Ourang-utang which is found in that country. The papers upon the subject published in the *Annals of Natural History* are full of interesting information, and the care and trouble with which the knowledge was obtained deserve our warmest admiration.

With regard to the Gorilla, the subject of the present notice, it is to be regretted that our knowledge concerning the habits and customs of this member of the ape family

is still very limited, although there is no reasonable doubt that this animal was discovered two thousand three hundred years ago. It may appear strange that this large and formidable beast should have remained so little known during that long period, but when we consider the danger to which the traveller must be exposed in his attempts to penetrate into the country inhabited by this monster and the little chance held out of his return, together with the small inducement to risk so much in travelling in these regions, the absence of any reliable information on the subject is, in a measure, accounted for. We are, therefore, obliged to rely either on the statements which have been made from time to time by travellers who have visited the country or on what the natives who reside there have told the explorers. It must be borne in mind that it would be as unjust not to accept statements as it would be unwise to adopt and to readily believe some of them. It, therefore, becomes necessary to carefully consider, from what we do know, the probability of the truth of the various travellers' tales that have been told. By the natives it is stated (and history agrees) that these animals always attack man and invariably carry off women and children, and that individuals of our species have been obtained by the apes and kept among them for years. Such accounts have been received from the simple-minded natives, whose honesty and truthfulness are sometimes in strong and painful contrast to the misrepresentations of the more highly educated, enlightened, and less humble. Certain it is that the natives of the country entertain the greatest fear and dread of these creatures. Our surprise at this is at once removed by an examination of the animal. Its power must be prodigious; its fierce and brutal aspects render it at once the most repulsive of brutes; the enormous size of its arms, its grasping power, the large

size and strength of its teeth and jaws, all tend to prove that not the least doubt can be entertained respecting the danger of its attack. Added to all these physical advantages it is said to be gregarious, which is highly probable, as many of the large baboons of Africa are well known to be so, and the nearly-allied chimpanzee is also said to be met with in family groups.

The assertion by travellers that this last animal and the gorilla are said to defend themselves with sticks and stones appears to require confirmation. We already know that the ourang of Borneo when pursued will ascend the highest trees, and tearing off the branches, or large fruit, shower them down in a terrific manner, exhibiting his rage and strength, doubtless for the purpose of intimidating his pursuers. He does not, however, appear to throw these direct at the object of his displeasure. The African species differs considerably from the ourang of Borneo and Sumatra, and probably may do something more than throw down the branches, etc. It has been ascertained from anatomical examination of dead specimens that these large apes appear, beyond doubt, to approach nearer than any other known mammal in their structure to man. It is desirable, on the other hand, to examine and to point out as clearly and as briefly as possible, in what they appear to differ mostly from man, in order that, by a few characteristics, we may be at once able to distinguish the one from the other, believing that we have in the gorilla the nearest approach, in formation, than any other representative of the brute creation to the human species. It is evident from the contracted form of the hind limbs that the gorilla cannot stand upright; the bent or stooping posture, coupled with a heavy body, renders this animal unable to progress on the ground without the assistance of his front limbs. When walking on a plain surface the

fingers are half closed and he walks on his knuckles, which are bent under at the second joints; the toes also, except the great toe, or thumb, of the hind foot are also bent under so that he walks on them and the outside of the foot and heel. In this respect, therefore, it is seen that he is at once inferior to man, and that it requires no argument to be adduced in order to separate the gorilla from the human race, nor is any great power of discernment necessary to distinguish him. Numerous other peculiarities can be pointed out: the coarse, strong, grasping heavy paws; the short and ill-developed thumb; the want of flexibility in the fingers, which are joined together as by a web from the second joint, renders the performance of the multifarious duties of a hand utterly impossible. These easily-observed differences are, however, not the most important ones. The greatest dissimilarity which attracts our attention is to be observed in the form of the skull, and in the development of the brain and the nerve system; the small size of the brain, as compared with the weight and bulk of the animal, when considered relatively in connection with man, shows so marked a contrast that the utter want of intelligence is no longer a matter of surprise.

There is one thing well worthy of notice respecting the gorilla, chimpanzee, and ourang—it is that the brain in the young animals appears larger in proportion to their youthful condition, but as soon as the shedding of their first set of teeth sets in the bones of the face, together with the jaws, enlarge to a certain extent, the permanent teeth are developed of a much larger size than the former ones, and the brain appears not only to be checked in its growth, but from the increased thickness of the skull in the adult the brain seems to be cramped in a smaller space.

THE CHIMPANZEE JOE.

Joe was a great favourite, full of tricks and tolerably intelligent. Many of his funny ways have been told in print. I frequently had him on my back and shoulders, and was so familiar with him that I, in fact, thought him perfectly free from vice; in this, however, I was greatly deceived. Master Joe seemed particularly fond of a man named Dexter, employed in the menagerie; Dexter now and then would have a romp with Joe. One day Joe was on Dexter's back apparently full of fun when, without the slightest warning, he flew at Dexter's throat, biting him severely, and it was with some difficulty that he was removed. After this my advice was, "Keep Joe at a respectful distance." This treachery is not uncommon among pet wild animals.

POOR JOE'S EFFECTS.

The following letter appears to have been intended for the "animal doctor" who had had the honour of treating the famous chimpanzee:—

"*Zoo*,
"*April* 1, 1874.

"SIR,—Your account for the medicine supplied to poor 'Joe' has come to hand; I am at a loss to know what to do about it. It is difficult, and perhaps impossible, to ascertain what property Joe' has left in his native country. He has not supplied us with the names and addresses of any of his family, and he died without a will, in fact, he died much against his will, and the very small effects (principally his wardrobe) left by him, if sold by auction, would barely cover the expense of the advertisement, and unless well advertised no one would look at them.

"It is quite possible they would sell better if not looked at. Another difficulty will be to catalogue the lots; they would consist of wearing apparel (and, may we say, jewellery); his chain, collar, and fancy necklace might be thought a desirable addition to some young swell's adornment, knowing how much their

former possessor was admired by the fair sex. His rope-swing and pole would certainly go towards balancing his last account; the former might be used to suspend, for a time, a troublesome creditor, perhaps suspend him long enough to prevent his making a second application.

"These matters may be worth your consideration before proceeding to extreme measures. We have reason to believe that 'Joe's' estate was partly claimed by King Coffee, still there is the landed property together with the timber and fruit trees, to say nothing about his forests of nuts (over which 'Joe' had the first pick and as frequently the last), at the time King Coffee was busy stealing from somebody else. We have considerable doubt, however, if 'Joe' had much wealth deposited in the Coomasie bank, and, if so, a considerable deal more doubt as to its recovery, as a very heavy check (cheque) has fallen due upon all the banks in that country.

"A. D. BARTLETT."

I cannot remember now whether this letter ever reached its destination.

A CHIMPANZEE WEDDING.

INTRODUCTION.

In every part of the world the ceremony of marriage is characterized by some form of festival, an indication of mirth and joy, depending much upon the circumstances of the parties. Separate and distinct nations have their own peculiar way of celebrating a wedding. A work in which these rites and ceremonies were given would, if written, form a very acceptable volume. Particulars could be collected and given with many interesting details, all tending to show the habits of our species, together with much useful and valuable information brought under one head.

However, the ceremony I am about to relate is of a nature a step lower in creation than is usual, and one not so frequently met with as the union of a pair of our own species, nevertheless the facts are very remarkable and

show an amount of intelligence in the larger apes that will, by many, be scarcely believed. That these brutes have a quick mode of displaying either their love or their anger no one can doubt, and upon seeing, for the first time, two of them of opposite sexes brought within sight of each other it is most interesting to note the affectionate manner of meeting; it is singular and worthy of record. The fact that there is apparently little in other lovers of which to make choice, may perhaps lead us to say it is love at "first sight;" and this appears certainly to be the case, for there can be but little difference in their personal appearance, since the colour of the hair, general complexion, and form of features are wonderfully alike in all this species, when looked at from a human being's point of view.

Moreover, a person who, by long experience and frequent opportunity of watching, is able to imitate the sounds of their voices and their gesticulations can encourage them to recognize and respond to him when he endeavours to attract their attention, thus showing that their language is very limited and upon a level with that of most other animals, and probably quite incapable of any advance or improvement.

Their utterings consist simply of sounds expressive of either pain, fear, pleasure, or anger, and by the imitation of these the animal is influenced immediately. It is therefore easily ascertained upon the introduction of the individuals whether it is likely to be one of friendship or otherwise, by the voice and manner. This was singularly illustrated upon the occasion about to be narrated.

The antics of a healthy chimpanzee are certainly extremely remarkable. Full of drollery and lively mischief, he is playful and determined in sport, and carries on his frolics with great energy; jumping about, slapping the ground, drumming with all fours, climbing, tumbling, roll-

ing over and over, turning somersaults, swinging from place to place, standing erect and hammering with his hands after the fashion of a boxer; screaming when hurt or offended, and making friends as soon as the fit is over, but, nevertheless, revengeful at the moment, inflicting sharp bites on the instant; fearfully jealous of a rival, and, when

INTRODUCTION.

enraged, rushes to attack with great fury, but, if defeated, beats and knocks himself about.

The chimpanzee looks intently on any new object and examines, apparently with great care and minuteness, everything placed within reach; soon, however, he, like a spoilt child, discards the new things and looks anxiously for something else to amuse him.

THE WEDDING.

Seldom has the chance fallen to the lot of any one to witness the first meeting of a pair of these singularly interesting animals.

In the present instance the female, "Sarah" by name, had resided in the Gardens many months, and in all probability had not seen one of her species for a very

COURTSHIP.

long time. Her age was about five years, or perhaps a little older, at the time that the event which is about to be related occurred.

In the month of August 1865 a fine male, about the same age and size as "Sarah," had been obtained from a dealer in Liverpool. It was thought desirable to introduce him at once to "Sarah." Upon seeing each other they

both uttered short sounds, and protruding their thin lips as far as possible, until they formed a pointed appearance, they leaned forward towards each other until their lips touched, as if gently kissing; this occurred while the male

WEDDING.

was outside the wire-work. The door of the large cage, in which was the female, was then opened, and the two animals rushed into each other's arms, and, squatting on the floor of the den, hugged each other in the most

affectionate embrace, at the same time uttering sounds of gratification and satisfaction. In a few seconds they rose up on their legs and, standing as erect as their form would allow, with their arms raised above their heads, they grasped each other's front paws and gave vent to loud yells and howling screaming barks, at the same time looking upwards as if returning thanks to some invisible friend. The house resounded again and again with the sound of their powerful voices. After this performance a more minute examination took place. They searched one another all over, smelling and gently feeling each other from top to toe, then gave each other another hearty hugging and uttered a more gentle vocal congratulation. Thus the two strangers made friends and sympathized with each other, wonderfully like human beings.

CHIMPANZEE'S INTELLIGENCE.

A chimpanzee which I tried to educate made miserable attempts to thread a large packing-needle, and also to unlock or lock a door. The nearest approach to success was in the attempt to spin a humming-top, but this was only accomplished with great assistance. A chimpanzee in the Gardens was compelled always to use a spoon, which he did with considerable difficulty. This natural want of intelligence in the chimpanzee prevents his learning, and it is easier to teach a dog, who, from his superiority of brain power and instinct, more readily understands every action and word of command.

Our chimpanzee was very proud of a fine showy dress, allowing himself to be measured, and showed every intelligence towards the dress-maker to have a scarlet velvet dress fitted on.

CHIMPANZEE STRENGTH.

The nearly adult female in the Society's collection was able to bend and tear out the iron bars of a den sufficiently strong to hold a lion.

BARTLETT'S BABY.

WELCOME, little Stranger! You
Are the darling of the Zoo,
Bartlett's babe, the public pet.
Lucky, lucky Zoo to get,
At a cost scarce worth the mention,
Living proof beyond contention
Of—oh! well, of whatsoever
Savants sage and critics clever,
On their controversial mettle
May—or maybe may *not*—settle.
Six-and-twenty years ago
(Buffers elderly may know)
Rose the great Gorilla feud;
Dr. Gray was rather rude,
Rather on Du Chaillu down,
And the shindy stirred the Town.
Owen, great on brains and bones,
Lectured it in learned tones;
Huxley to the battle rushed;
Mutually they "pished" and "tushed"
In that calm and courteous way
Savants have, when they're in fray.
Mr. Punch, with ample reason,
Called you "Lion of the Season,"
Great Gorilla. Now 'tis plain
The old fame revives again.
Happy Bartlett! Lucky Ape!
Fortune comes in curious shape.
You perchance, oh simian child!
Might have roamed the Afric wild,

Like a nigger unreclaimed,
Unobserved, unknown, unnamed,
Fame concerning you quite dumb,
Even your "colossal thumb,"
By the scribes who columns vamp us,
Undescribed; your "hippocampus"

"HERE'S ANOTHER GUY!"

OR, THE BABY GORILLA AT THE ZOO.

Nurse Bartlett. "He shall have a Fifteen-Shilling Pine, he shall! and Finest English Hot-house Grapes, he shall! and Gold-Dust too, if he cries for it, the little Darling!"

(Whatsoever *that* may be)
Not of notoriety.
Now!—Ah, infantine Gorilla,
Every small suburban villa
With your rising fame will ring;
All the sort of folk who bring
Buns unto the prisoned bear,
To your cage will come, and stare.
Buns? Oh, Bartlett,—master sage,
Autocrat of den and cage!—
Nothing will begrudge, I'm sure,
That may nourish, please, or cure
His prognathous little pet.
Half the luxuries you'll get
Would leave satiate and cloyed
Any hungry "Unemployed."
Cakes—and, if you like it, Ale—
Oh, Gorilla, will not fail;
Gunter's you may sack at will,
Or, if you prefer to fill
Otherwise your dainty maw
Than with sweeties and stickjaw,
Like the indiscriminate bear,
You may choose your Bill of Fare.
Toys? Ah, bring them, baby, quick;
Will a monkey on a stick
Touch a sympathetic chord?
Well, let's hope you won't be bored,
Baby Ape, by Bartlett's love,
And the crowds who'll stare and shove,
Long for Afric wild but free,
And a station "up a tree,"
Watching, with prehensile thumb,
For—whatever food may come.

THE GORILLA.

The annals of the Zoological Society contain some interesting records of the gorilla.

At an evening meeting of the Zoological Society, held on February 22, 1848, a paper was read by Professor Owen on a new species of chimpanzee. This animal was

THE GORILLA.

distinguished from the well-known chimpanzee by the skull alone, and the name proposed by the Professor was *Troglodytes Savagei*, after Dr. Thomas Savage, by whom it had been discovered, and its existence made known to Professor Owen.

At an evening meeting of the above Society, held on

April 11, 1848, Professor Owen read a supplementary note on the great chimpanzee, and led him to adopt the name proposed by its discoverer, of *Troglodytes Gorilla*, adopting the term used by Hanno in describing the wild men which he discovered on the coast of Africa during his famous voyage.

On January 11, 1859, Professor Owen read a very exhaustive paper upon the external characteristics and affinities of the gorilla, specimens, more or less perfect, having been received in spirits. In 1861 we had the adventures and explorations by Paul B. du Chaillu, who brought to England skins and skulls of adult gorillas, and gave full descriptions of the habits of these and other members of the family; and, although much doubt was at the time expressed of the truth of Du Chaillu's statements, many of them have since that time been fully verified.

There is always considerable difficulty in obtaining authentic information with reference to the history of almost all important animals. The owners have, naturally, a wish to sell them at the highest price, and are not always very particular in their statements as to the cost and trouble they have had in obtaining them; and it is sometimes useless and vexatious to make inquiries that are answered by such unlikely stories, that, if published, would be scouted as absurd fables. Such being the ordinary condition under which animals of this kind are offered for sale, it is a waste of time to attempt, in most cases, to ascertain the truth.

I have taken the liberty of reproducing the portrait, the original block having been destroyed by fire.

THE GORILLA AT THE ZOOLOGICAL GARDENS.

It may seem strange that, considering that the Zoological Gardens have been established over sixty years, no specimen of the gorilla has hitherto been received or exhibited in their vast collection. From time to time within the last twenty years examples of this remarkable animal have reached Europe; they have been but few—perhaps not more than five or six—but, owing to their poor condition or the exorbitant price asked for them, the Society never felt disposed to purchase any of them. One or two only of those that have been imported have lived more than a few weeks. Under these circumstances, it has always been considered a very risky speculation to purchase an animal whose life was so likely to prove a short one.

The individual, now exhibited for the first time in the Gardens, arrived on Monday, October 10, having been landed on the previous Friday at Liverpool, Mr. Cross, the well-known animal dealer, being the purchaser. Mr. Cross lost no time in transferring the animal from Liverpool to the residence of the well-known chimpanzee "Sally." On arrival the poor beast appeared to be completely exhausted, and almost lifeless; no doubt partly from exposure to the cold and the shaking and noise of the railway journey. In this condition no one could be expected to offer to purchase the animal; in fact, the owner, Mr. Cross, could not ask any one to take it, however low the price he might ask; all he asked was that it might be attended to, and that whatever could be done to save it should be done. After a day or two's careful attention it began to revive, and the first food that tempted it was grapes. A variety of fine fruit was then placed at its

disposal, consisting of pine-apple, fresh green figs, bananas, pomegranates, and grapes. The pomegranates appeared to be most favoured, for it took to this fruit with evident relish, leaving nothing but the hard outside shell. Since then it has fed upon pine-apple, grapes, apples, pears, bananas, dates, raisins, and bread. It has thus improved in strength and temper, and has already made friends with the keeper, Marsbridge, and, no doubt, will soon become an affectionate and amusing companion, and an interesting addition to the Society's splendid collection.—*Land and Water*, October 22, 1887, p. 342.

ANDAMAN MONKEY (*MACACUS ANDAMANENSIS*).

The discovery in the Andaman Islands of a new species of Quadrumina was a very important addition to our knowledge of this interesting country. One or two species of monkeys were known to exist on the adjacent Nicobar Islands, the common Macaque (*M. cynomolgus*) being one of them, but until Captain Brown brought home the present individual no monkey was known to exist on the Andaman islands. One or more species of monkey being found on the Nicobar Islands would lead us to expect such a thing as highly probable, and had the same species of monkey been met with, nothing very remarkable would have been thought about it, but the discovery of a species hitherto unknown upon the islands that have already furnished us with a man and a pig that are *quite unlike* any of the neighbouring races, is a circumstance deserving particular attention, and affords materials for much speculation and investigation.

This new and unique monkey was presented to the Zoological Society by Captain Brown, R.N., of her Majesty's ship *Vigilant*. It dated its joining the ship's

company, from Port Blair, Andaman Islands, in the Gulf of Bengal, lat. 11° 43′ N., long. 92° 47′ E., in the year

THE ANDAMAN MONKEY AT THE ZOOLOGICAL GARDENS.

1864. "Jenny" (for that is her name) was supposed to be eight or nine years old. For the last four years she had "served" on board the ship, and having passed all the dangers of the Abyssinian campaign, and discharged with

a first-class certificate and silver chain and medal for good conduct, was waiting to receive her share of the prizes taken during the time she was in her Majesty's service.

"Jenny" stood about 2 ft. 4 in. in height. In general appearance she was most like the "pig-tailed" monkey (*Macacus nemestrinus*), but was at once distinguished from this species by a remarkable arrangement of the hair on the top of the head, which was somewhat of a V-shape and was parted down the middle. The hair itself was very fine, and it was elegantly arranged round the ears. The first impression upon seeing this animal was, that it was intermediate between *Macacus rhesus* and *Macacus nemestrinus*. The face was by no means fierce; the features might even be called good-natured. She had been made a great pet by the sailors, the result being that she has been educated to an extraordinary degree of cleverness. She was fond of company, and her constant companion was a chicken (a regular ship chicken with hardly any feathers), which lived with her in cage day and night, and accompanied her in her perambulations. She walked upright on her hind legs with remarkable facility, and with much less effort than even the performing monkeys as seen in the London streets. When in an erect attitude she would carry things. Thus she would pick up her chicken and run about with it, holding it in her arms as a nurse does her child; the chicken did not seem to mind this in the least. At the word, "Throw her overboard," "Jenny" threw the chicken smartly away from her. It has been said that monkeys would talk but that they know if they talked they would be made to work. Now the Andamanian "Jenny" formed an exception to the "working" part (only that was very agreeable work) of the story, for when a soda-water

bottle was given her, she would set to work to untwist the wire; this done, she would get out the cork, if it were not too tightly fixed, and then drink the contents of the bottle. Her attitude in drinking was something quite new. She sat down on her haunches, held the bottle with both hands, and *tilted the end of it up with her hind foot*, so that the liquid should flow at the proper level into her mouth. In this attitude her appearance was most comical, and at the same time most interesting.

The most extraordinary part of "Jenny's" performance was that she *smoked a pipe*. Most monkeys will carry a pipe in their mouths and pretend to smoke, but this was the first monkey that we have ever known actually to smoke lighted tobacco out of a pipe.

Our illustration shows "Jenny" adorned with her silver collar and war medal, enjoying herself after her day's work. Most monkeys will drink grog, but "Jenny" was especially fond of it, and she always took her glass with her pipe, which she enjoyed quite as much as Forecastle Jack after he had been reefing topsails. Our friend Mr. Buckland called to see "Jenny"; the fair Andamanian, devoid of shyness, repaid the compliments this gentleman offered her, in monkey language, by snatching a half-smoked lighted cigar out of his mouth, and did him the honour to finish it, throwing away the end when it threatened to burn her lips.

The Andaman natives are said to be the most degraded of human beings. If "Jenny" was an average sample of the monkeys, we would sooner be a monkey than a man, if nature had cast our lot in the far distant Andaman Islands.

MARMOSETS.

THE MARMOSETS AND OTHER SMALL MONKEYS OF SOUTH AMERICA.

Not only is the generic distinction between the Old and the New World monkeys well marked by many external, as well as internal, differences, but their food and mode of feeding also differ to a very great extent.

The marmoset and other South American monkeys feed almost exclusively upon insects, such as caterpillars, moths, butterflies, beetles, spiders, grasshoppers, and flies, together with fruit, green leaves, and berries; occasionally small snakes, young birds, eggs, and the young of small mammalia. These articles form their principal food. But the true spider monkey (*Ateles*) is, more strictly speaking, a fruit and vegetable feeder, and this genus is noted for being of an extremely gentle, mild, and timid disposition. Having given a general outline of the kinds of food eaten in a wild state by these creatures, I have found that, in captivity, they can be kept by feeding them upon bread-and-milk, ripe fruit, vegetables both raw and cooked, such as potatoes, carrots, lettuce, and other green meats; occasionally a fresh-killed sparrow or other small bird may be given, and for a change boiled or roast mutton; the bones of fowls or rabbits may be given, and, in fact, almost any kind of animal food in small quantities.

They are not affected in the slightest manner by the

cold, and they will bear excessive heat. I have sometimes allowed some of the weakly and delicate members of this family to have free run of my house, and it is a perfect pleasure to find them basking before a large kitchen fire, lying on the hearth within the fender in such a position as would lead any one to expect that they would be roasted alive. Out of this they would run into the open air during the coldest weather in winter, to search the dust-bin for some anticipated toothsome delicacy; this they frequently repeated without in any way receiving the slightest injury; in fact, I have always found them thrive better when allowed to have this freedom.

It has sometimes happened that the marmosets have bred in captivity, producing one and sometimes two at a birth. The young one clings so tightly to the body of its mother that, being hidden in her long fur, it is very difficult to see. The young are suckled for five or six months, but remain with the mother long after this period, and become very amusing, darting off after some insects or other food which it has discovered, returning to the mother and hiding itself on her breast.

My son Edward states that while in Peru he found a very handsome species of marmoset (*Midas devilli*). "This species is extremely delicate, and will not bear the least cold. I have had several alive for two or three weeks, but they appear to suffer from cold and die. They are kept, however, by the Indian women, who make pets of them and put them into the long hair on their heads; with this protection they are able to live for a long time. Having become tame, they frequently hop out to feed, and, having captured a spider or two, scamper back again, and hide under the luxuriant crop of hair of their owners, who are generally unwilling to part with them."

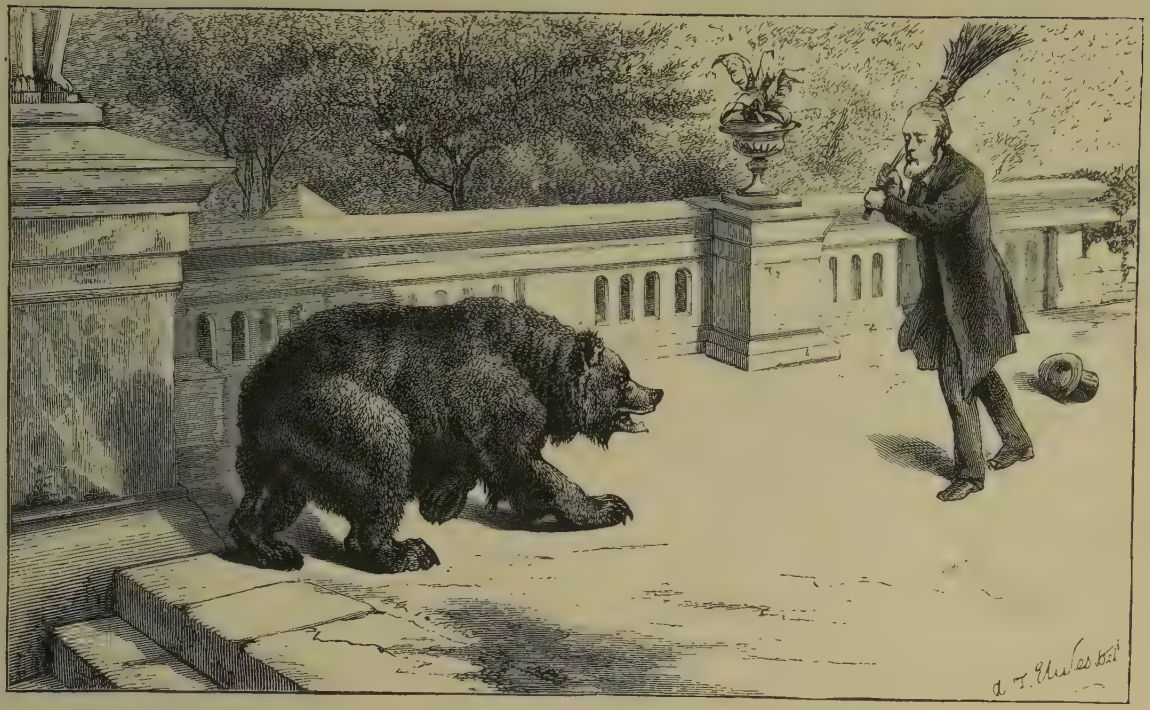
BEARS.

Bears are most amusing, clever, and interesting animals; playful, comic, easily taught a variety of tricks; intelligent, cunning, and restless; easily offended; treacherous and cruel. Thus may their character be summed up. I know of no animal so much petted as a young bear. His movements are so funny, he is so playful and so soft to the touch, and woolly. On board ship he is most agreeable; he can climb the rigging like a sailor, tumble head-over-heels, and walk on his hind legs. There is no help for it, he is everybody's favourite. Alas! this state of things does not last for ever. A change comes over him, it may be a very gradual change, but the pet is getting stronger every day, and is not inclined to be treated with the familiarity he formerly appeared to enjoy. He requires more liberty, and does his best to get it. All at once it is discovered that he has broken his chain, or that he has found out a weak place in his cage or den, and, probably, in the middle of the night he will be amusing himself in the larder, or at any rate in some place where his presence is least desirable. Now comes the question, Who is to be master? Bruin wishes to be free, and tries his utmost to accomplish his purpose, entirely oblivious of all the kindness and all the delicacies to which he has been treated. He soon satisfies you that his independent and determined conduct is likely to cause you considerable trouble, leave alone the chance of a risky and dangerous encounter with him.

I have known more keepers and other persons killed or seriously injured by tame pet bears than by any other animal.

The occasions on which bears have managed to escape, for a short time, have not been numerous; two or three only may be worthy of mention. On one occasion a Polar bear gave a great deal of trouble, but he was eventually driven into a place of safety and captured without any damage being done. This bear's escapade is narrated in the "Escape of Polar Bear." On another occasion an American black bear was clever enough to climb up a chain and escape from the bear-pit.

I happened to see him from a distance, and, arming myself with a dusty stumpy old birch-broom, I went towards him. On coming up with him I dealt him a smack in the face with the broom which rather astonished him, and, with the dust in his eyes, he scampered away evidently in a very ill-humour, descending the steps of the terrace on to the lawn. He ran and tumbled about the chairs, giving me time to call for assistance. It was not long before three or four keepers put in an appearance armed with dung-forks and other weapons. Mr. Bruin then thought it desirable to try and return to the pit. To do this he ascended the steps, and, mounting the top of the terrace wall, walked along until he arrived at the pit from which he had escaped. I followed him at a respectful distance, and seeing that he was looking down into the pit, and fearing that he might have some difficulty in getting into it, or that he might change his mind and take another walk, I made a rush at him with the stumpy broom and sent him headlong below. I was afraid he was hurt, as he moved about very little for some days afterwards.



BRUIN AT LARGE.

To face p. 154.

ESCAPE OF POLAR BEAR.

During the time Mr. A. Miller was Superintendent of the Zoological Society's Gardens the large Polar bear managed to escape from the place in which he was kept. He was discovered, a little before six o'clock one morning, seated among the shrubs in the Gardens, by Mr. Groom, the wire-worker and cage-maker of Great College Street. An alarm was immediately raised, and all the keepers were assembled armed with forks and sticks and anything else available. The head-keeper, James Hunt (with that care that becomes a thoughtful husband and father) made the best of his way to the apartments where his wife and children slept at the back of the old, or circular, aviary. Telling his wife of the danger, he closed the shutters of the windows and locked the door, making sure of their being safe. He then proceeded to the scene of action.

Our white friend looked steadily at the pale faces, and, not appearing anxious to try his strength, he walked leisurely away from the crowd, who, like most other crowds, felt bound to follow. A strong cord being in readiness and carried by Hunt, was thrown lasso-like and with good aim, the noose having caught over the animal's head. He at once made off, and quickly got over some palings; but here a struggle took place. The men held on bravely, and the cord fitted tighter round the neck of our Arctic traveller, who now put forth his power, so much so that, after several jerks and a determined pull, snap went the line close under his ear, leaving the noose fixed like a tight collar round his throat. With an angry growl and a scratch or two with his paws he managed to rid himself of the unpleasant bandage, then shaking himself

and looking round on all sides, seemingly with a determination not to be caught in that way again, he trotted off at a brisker pace than before. No sooner was an attempt made to follow him than he turned to face his foes, and satisfied most of them that a too close acquaintance was dangerous; at the same time it was clear that he had no particular wish to rush into mischief. As the men stood still in a body he merely looked at them, and, after a few seconds' consideration, walked leisurely away.

It was then arranged to muster in front of him whenever he attempted to go in any direction leading out of the Gardens, or to any part of the Gardens in which he was likely to do damage.

If this plan succeeded they could turn him without going near enough to be in any great danger, so after two or three hours' dodging him about they managed to drive him into the passage at the end of the Carnivora dens, on the north side and close to the den he had escaped from. Here he was at once secured. Possibly no one suffered, in comparison, anything equal to the fright of the wife and children of the head-keeper, whom he had carefully locked in, and who were in the dark all this time. They naturally supposed that everybody must have been killed, and that it would be their turn next, because the few hours of this dreadful suspense and uncertainty seemed a much longer time than was really the case.

THE SKUNK.

THE very mention of this creature's name at once calls up the recollection of no end of queer stories and funny tales told by our Yankee cousins respecting the abominable and overpowering stench that may be encountered on too near an approach to this detestable animal.

No one who has once had a *taste* of the odour—I use the word "taste" advisedly, as the sense, in some instances, by which smells or odours are perceived also at one and the same time begets a sense of taste, and therefore the perfume is *tasted*—would feel desirous of renewing the acquaintance; so dreadful and nauseous is it that it, in some persons, produces sickness and headache of the most painful kind. As, however, every rule has its exception, so has this, as notwithstanding the terrible character attached to the skunk, it is a very clean and well-behaved individual; in fact, a sweet skunk, if one may be allowed to make use of that mild expression. It is, indeed, remarkable and singularly interesting to find an animal of this description so tame and so good-tempered that it will allow itself to be tenderly handled and lovingly caressed. This is the case with more than one sort of skunk. Several specimens of the common species of North America (*Mephites mephitica*) have been brought to this country perfectly tame and well-conducted; had it been otherwise they never would have been allowed to cross the Atlantic, as one whiff of the odour most certainly would have called down upon the offender the vengeance of the entire ship's

company, and Mr. Skunk, with his perfumery, would most assuredly have been in imminent danger of being thrown overboard, and probably been the innocent means of disgusting some hungry shark.

It may naturally be supposed that the skunks, which have arrived safely after a long sea voyage, have been submitted to some kind of operation, and that the glands, by which the fœtid odour is secreted, have been removed, or, more reasonably, that they have been subjected to some wonderful and far-famed disinfectant; in fact, that the art of an American Rimmel had triumphed over nature; but such is not the case.

An amusing incident occurred not long since to a dealer in wild animals, who boasted that he had skunks that "had been deprived of their unpleasant properties, and thereby rendered clean and wholesome." However, to his utter dismay, while exhibiting a tame and harmless skunk to a customer, he accidentally held it within reach of a mischievous monkey, which, grasping the tail of the skunk, inflicted a sharp bite upon that sensitive appendage. At this trying moment the poor skunk resented the insult and injury in "true skunk fashion," and the result was perfectly astounding to the monkey, to the dealer, and to the would-be purchaser of the tame skunks; had an explosion of gas or of gunpowder taken place the latter would, in all probability, not have disappeared so completely, for upon the dealer looking round his customer was nowhere to be seen, not even a vestige of him remained to bear witness to the "'orrible tail," and it may not be out of place to mention that he never returned to complete the purchase, or even to inquire after that "tail." It is therefore advisable not to make too free or play too roughly with your tame skunk, or, like the unlucky ape, you are liable to be poisoned at any moment.

SEA-LIONS.

THERE have been kept in the Gardens for many years several kinds of the so-called sea-lions.

Their principal food is mostly whiting, but I have never observed any of them masticate their food, they swallow it at a gulp.

I was rather curious to know, in the event of one of the sea-lions capturing a large fish, what the creature would do. In order to satisfy myself upon this point, I procured a large codfish weighing about 16 lbs.; this I gave to the male sea-lion. The beast seized it near the head, and, by a most violent jerky movement from side to side, tore a large mouthful out from the fish; this process he again and again repeated, and, by so knocking about and crushing the fish, it was in less than half-an-hour entirely consumed.

He never attempted to use the front limbs to hold or assist in tearing it to pieces, but simply, by the bite and sharp jerk, disengaged the various portions.

SEA-LION AT CREMORNE.

In 1865 I gave the following interesting particulars respecting the seal living in Cremorne Gardens. In size it is larger than a full-grown mastiff dog, the neck very long and thick, the head rather narrow, but otherwise

much like the head of a lioness, and the eyes very full and prominent (quite unlike our flat-eyed seals). The animal stands on all-fours, the hind feet which are very long, being under the belly, and the front legs resting on the wrist with the feet turned outwards on each side. These latter feet are also very long, and with their aid it jumps and bounds along at a great rate of speed, reminding one of a weasel or polecat; in this manner it progresses as fast, or nearly so, as a man can run. It climbs over chairs and other obstacles with great ease, ascends a raised platform upwards of 5 ft. high, and, at the word of command, pulls a trigger with its mouth and fires off a cannon. It roars or growls very much like a lioness, but less loudly, and exhibits great attachment for its keeper, but otherwise appears fierce to strangers. It rears itself perfectly upright against the keeper, clasps him round the neck with its front flippers and places its mouth to his lips.

In this position it appears about 6 ft. high, and it certainly has more intelligence than any of the *Felidæ*. If the keeper throws his cap across the room, the animal runs immediately after it, and returns with the cap in its mouth as readily as a well-trained dog. The colour of this animal is a rich brown; the ears are narrow, and about 1 in. in length; the nose is naked like that of a dog, but the nostrils are capable of being closed; the whiskers are long and curved downwards; the tail shorter; the hind feet have nearly straight claws, the fore feet have only rudiments of the claws visible; the teeth are very dark in colour, and look like the teeth of a very old animal.

SEALS.

REMARKS UPON SEALS.

Of these intelligent and easily-trained animals the Society have of late been successful in obtaining several important additions. In 1870 the collection contained five species of this interesting family, consisting of the following genera, *Otaria*, *Phoca*, and *Cystophora*, which are represented by five species, viz.:—*Otaria jubata*, *Cystophora cristata*, *Phoca fœtida*, *Phoca vitulina*, and *Phoca greenlandica*.

People living in London and other large cities think little of the large number of skins and enormous quantity of oil that is brought to this country annually, and which is obtained by the wholesale slaughter of these inoffensive animals, and have no idea of the numbers that must perish to supply the constant demand; for this destruction is carried on not only in the Northern but in the Southern Ocean. It is in the latter that the much-prized fur seals are obtained in the greatest abundance from the different species of *Otaria*, or eared seals, while most of the northern seals are known as hair seals. Both of these forms are represented in the Society's Gardens, but much difficulty exists in the minds of most people in distinguishing a hair seal from a fur seal when alive. The fact is that fur seals are covered with hair similar to the covering of the other kinds, but in the preparation of the skin the hairs are all plucked out, just as the skins of swans are plucked of their

feathers, leaving only the down, which fairly represents the fur left on the seal-skin after the hairs have been removed. The hair seals cannot be treated in this manner, as they do not possess the same kind of undercoat of fur, and, consequently, if plucked or denuded of hair, would be useful only as leather.

The everlasting slaughter of the fish-eating animals has been carried on year after year for ages with increasing skill; with the aid of steamships, and with the great improvement in fire-arms, it is a matter of surprise that their numbers hold out, for they breed but slowly, produce but one at birth, and this but once in a year, and require several years to grow to maturity. Another equally wonderful matter, well worthy of consideration, is the supply of food required to sustain a large population of these fish-devouring animals. Take, for instance, the small species (*Phoca vitulina*) of our own shores, whose daily consumption in a captive state would be equal to 10 lbs. weight; now it takes forty herrings to weigh 10 lbs., but no doubt when at liberty and full of activity the creature would eat a much larger quantity, therefore we may safely say that 1000 of these small seals would require 40,000 herrings daily to support them. Now if we say that the northern seal fishery destroys 500,000 seals annually, some idea is given of the prodigious quantity of fishes that must be spared the same fate. We must therefore congratulate ourselves by supposing that a large portion of those fishes find their way to our tables instead of feeding our hairy, furry, and much-admired aquatic friends. The vastness of this inexhaustible supply is only faintly shadowed forth, the reality is beyond our comprehension. Imagine the abundance of fishes that must be consumed not only by the hundreds of thousands of different species of seals, porpoises, and other aquatic animals, but by the myriads

of fish-eating birds, and also by the large predaceous fishes that live upon the smaller fry; the apparently inexhaustible source is so wonderfully marvellous that the most fertile imagination almost fails to realize the possibility of a continuance of this state of things.

Whatever we may know of the abundance of animal life on land is totally eclipsed by the mighty myriads of creatures that swarm in the ocean, who aid to support in endless ways the fowls of the air and the beasts of the field, for the vast quantities of fish captured are frequently turned upon the land to enrich the soil, for want of other and better uses.

According to the official report made to the juries of the Exhibition of 1851 by Nicholay and Son, the number of northern seal-skins imported to England annually would exceed 500,000, and probably an equal number are annually killed in the Southern Ocean. Now, taking each animal to consume the minimum allowance of 10 lbs. weight of fish daily, it would require upwards of 2232 tons of fish per day to feed this multitude of seals. Now, supposing these fish to be herrings, the number consumed would be over 20,000,000: 20,000,000 of herrings as the daily allowance for what we know to be only a trifling number of the seals that exist in the Northern Ocean.

It is very interesting to observe the amount of intelligence exhibited by the members of this family, the readiness with which they become perfectly tame; but their capability of being taught to perform a number of very remarkable tricks, considering their form and structure, is rendered the more wonderful, and goes far to prove how much depends upon the well-developed and large size of the brain, for in all the genera of this well-marked group or family the brain is remarkable for its bulk, as com-

pared with the size of the animal. They soon become attached to any one who will take the trouble to feed and pet them.

ARE YOUNG SEALS BORN BLIND?

There was at one time considerable controversy in the daily papers on this subject, both sides strongly stating opposite facts. The following extract is from the letter of a skipper of a whaler, who had spent many years in the ice, and who since that made the famous voyage in the *Erin*, Mr. Leigh Smith's, to the Arctic regions:—"As regards the young seals, they can see as soon as they are born. I have shot the old seals in the act of giving birth to their young, and I found that they could see; and I have shot old seals with the young in them, and I have found their eyes open and quite clear. I have also seen a seal give birth and make for the water at once, and the young ones follow to the edge of the piece of ice after the mother. Their eyes are quite bright at birth."

To this question I am able to give a very positive answer. On May 23, 1868, I purchased of a dealer in Liverpool four adult seals. One of them proved to be in young, and was consequently placed by herself in a suitable enclosure with a small pond. She soon became quite tame, and fed freely. On June 8 she became restless, and on the following day about twelve o'clock she produced a young one, near the edge of the water. It was covered with a rather thick coat of hair, *its eyes very bright and wide open;* it turned and rolled about, divesting itself of the outer covering of hair, which formed a complete mat upon which the young animal lay. For the first hour or two after its birth it was very active, and within three hours it was swimming and diving about in the water

like an adult animal. It uttered a low soft *bah*, or single call-note, and looked about after its mother and crawled towards her when she came out of the water. The mother would turn upon her side in order to let the young one suck. The young seal was 32 in. long, and weighed 20 lbs. at its birth. A notice written by me appeared in the *Zoological Society's Proceedings*, June 1868, recording the above facts:—

NOTES UPON THE BIRTH OF A RINGED SEAL IN THE SOCIETY'S GARDENS. BY A. D. BARTLETT, SUPERINTENDENT OF THE SOCIETY'S GARDENS.

On May 23, 1868, the Society obtained from a dealer in Liverpool four fine adult seals (*Phoca fœtida*), said to have been taken in Heligoland. I noticed that one of them was of large size, and suspected that it was a female in young. I therefore had her placed by herself in an enclosure with a small shallow pond of water. Here she soon became perfectly tame, and fed freely from the hand of the keeper. We continued to notice the increase of bulk, and the movements of the young one were quite apparent.

On Monday, June 8, she was very uneasy, and appeared to me to be in considerable pain; I therefore kept a constant watch, and the man who had charge of her remained with her all night. She continued in this state until about twelve o'clock on Tuesday, at which time she produced the young one. It was born near the edge of the water, and in a few minutes after its birth, by rolling and turning about, was completely divested of the outer covering of *fur* and *hair*, which formed a complete mat, upon which the young animal lay for the first hour or two after its birth. When born it was very active, and within three hours afterwards

was swimming and diving about in the water like an adult animal. It uttered a low soft *bah*, or single call-note, and looked about for its mother, and crawled towards her when she came out of the water. She turned upon her side in order to let it suck, and I had every reason to believe that all was going on well. The young seal slept well, sometimes on its belly, sometimes on its side. The mother, however, appeared unwell and in great pain, and on the following day (Wednesday) suddenly plunged into the water and sunk to the bottom. Believing she was dying, I had her assisted out of the pond. She was in strong convulsions, and continued to roll and struggle until the next morning (this day), when she died. She appears to have had no milk. Finding the female unable to suckle her young one, I had it removed to the house, and have fed it by means of a bottle with warm milk, and a small quantity of cod-liver oil added to the milk.

The statement having been made that the species of seal could be distinguished by the mode of shedding its first coat (I believe it is said that the common seal, *P. vitulina*, sheds its coat as soon as born, while the *P. fœtida* sheds its first coat before its birth), I beg to say that this supposed distinction is shown by the above remarks to be of no value whatever as a means of distinguishing the species. I have no doubt both species are alike in this particular; and I have no doubt, from what I have seen, that the outer fur is sometimes shed before birth and sometimes immediately after birth in both species alike.

The young seal was 32 in. long, and weighed 20 lbs. at its birth.

It appears to me that the young animal shedding its outer covering compensates for the absence of the licking generally bestowed upon young animals by their mother. The seals never lick.

WALRUS.

THE first walrus purchased for the Society was brought to this country in 1853.

The second was brought to Dundee by one of the whalers belonging to Messrs. Stevens, on October 24, 1867. I went to Dundee to see this walrus, purchased it for £200, and brought it to London on board one of the steamers bound from that place for the Thames, where it safely arrived.

Its food consisted, principally, of mussels and clams, which I obtained from Yorkshire. It would also feed upon the flesh of whiting and cod-fish cut up without the bone. This animal lived, I think, about four months, the cause of death being perforation of the coats of the stomach by parasitic worms, which were, at the time, fully described by Dr. Murie in the *Proceedings of the Society*.

As the animal when alive was immature, the tusks not being more than 2 in. or 3 in. long, I had the skull of an adult male walrus with fully-developed tusks, which were probably 15 in. or 16 in. in length, fastened to a tree in the walrus paddock, in order that the visitors might form an idea of the size of the skull and teeth of the full-grown animal. I was much amused one day by a decent-looking man, who appeared to be taking great interest in and studying the beast, asking me if he had *shed that skull.*

THE ICHNEUMON.

(*HERPESTES GRISEUS.*)

FEWER animals are better known as pets than the common grey ichneumon, or, as it is more frequently designated, the mongoose. Scarcely a ship arrives from India that has not one of these sharp and lively little animals on board. Easily tamed and handled, they are much prized, and are, consequently, much in request. They, as is usual with most tamed animals, have a large share of praise bestowed upon them; the many tales related of their intelligence and power, and of their courage in killing vermin, and poisonous and other snakes, have made them famous, and any attempt to speak of them other than in accordance with the belief so firmly established in the minds of the admirers of their many virtues and abilities, would undoubtedly call down upon their calumniator the wrath of the said admirers.

That an animal so commonly kept and petted, and found so useful in ridding, to a tolerable extent, of vermin, buildings and habitations, in countries where rats, snakes, various lizards and innumerable pests abound, would naturally be greatly valued, there cannot be the least doubt, and the ichneumon, being such an animal, monopolizes a very large share of attention. It is, moreover, generally believed to possess the power of saving, at least, its own life, when bitten by the cobra or any other

venomous serpent, and to hint that such a thing is open to a doubt would be an attempt to dispel, in too summary a manner, the long-cherished belief in such an accomplishment on the part of the ichneumon. The writer, however, as a *Practical Naturalist*, accepts such, and all similar, statements with caution. Having had the opportunity of submitting to frequent experiments several of these animals, I have arrived at the opposite conclusion, and am perfectly satisfied that the assertion that those animals have a knowledge of certain plants, capable of curing the bite, is entirely a fable, and is without the slightest foundation. A perfectly harmless snake of considerable size has been held in the hand, and the ichneumon driven into a corner of the room; upon holding the snake with its head directed towards the ichneumon, the latter animal exhibited all the signs of the greatest fear and alarm, and rushed from the spot; but no sooner was the snake allowed to crawl or glide away on the ground, than the ichneumon darted upon it and killed it without difficulty. When an ichneumon finds a snake, poisonous or otherwise, it endeavours to steal suddenly upon it, and, by seizing the snake by the back of the neck, to crush the first few vertebra with his sharp and powerful teeth, its bite being most determined and vicious. The spine of the serpent being thus injured, the creature is rendered powerless; should the ichneumon in its first attempt fail, it will, with great caution, renew the attack, and in order to avoid being bitten will invariably try to rush upon the snake from behind. In such encounters the ichneumon does not always escape unscathed, and, although wounded, is not necessarily poisoned; however, should the beast be inoculated with poison, it succumbs to its effects. The animal that is unable to distinguish a perfectly harmless snake from a

poisonous one, we think would be at a loss to know how to doctor his wounds were they filled with poison as active and fatal as the poison of the cobra. It is probable that no living creature, the size of which does not render it impossible to be seized, is free or safe from its attack. It will, when other food is not at hand, take to the water like an otter, and swim about after fish. The slippery eel, which it kills in the same manner as it would a snake, is unable to elude its bloodthirsty intentions.

In fighting with each other, the mode of attack is completely changed; the neck of the ichneumon being thick and almost invulnerable, they bite each other about the feet and legs, and most frequently terminate their battle by getting fast hold of the throat. They live in holes in the ground, among loose stones or rocks, in hollow trees or under the roots, in old drains or in any comfortable hiding-place, their slender form enabling them to find their way into places so small, that it sometimes appears incredible that they could enter them. Their habits are both diurnal and nocturnal, according to circumstances. They usually produce three or four at a birth; the young are helpless and blind for some days.

The ichneumon is a dangerous animal to keep in a careless manner in the house, or in any other place, as should it by accident find itself at liberty, it will kill every living creature it can overpower. One kept as a pet by the writer escaped in the night from its cage, and cleared the poultry-house belonging to him by killing fifteen or sixteen valuable fowls through biting them on the back of the necks, and, no doubt, sucking a portion of blood from each of its victims. It is a well-known fact that a single animal will continue to hunt and kill, one after another, everything that it can find possessing life in the place, and in that way a very large number of its

prey are killed and left without any of their flesh being eaten. In places infested by rats or other noxious creatures the value of these wholesale slaughterers must be inestimable; for instance, on board ship, these animals would, but for the fear of their destroying the poultry stock, be invaluable.

The species of *Herpestes* are very numerous both in Africa and India. Some are of large size, and are extremely active and quick-sighted, the eyes being remarkable, and resembling those of the cat and the fox in having the pupils vertical, and doubtless this structure of the eyes enables the animal to see well with the least possible quantity of light; its nose, for it follows the scent like a dog, greatly helps it to find its food. It can discover the eggs of snakes and of other reptiles as well as those of birds, upon all of which it feeds voraciously. Should it find an egg too large and too hard for the teeth to break through, the animal will raise the egg with its front feet, and dash it upon the ground to break the shell. They are easily kept and fed upon bread-and-milk, raw or cooked meat, small birds, eggs, rats, mice, frogs, and, in fact, almost anything that usually comes to the table either of the Englishman or of the foreigner, and if allowed sufficient room and kept clean have no unpleasant odour.

THE GREAT ANT-EATER.

(*MYRMECOPHAGA JUBATA.*)

It is often remarked that there is something in a name, but if by the name of the above-mentioned animal we were to take it for granted that the food of the animal consisted of ants, and feed him accordingly, I fear no living specimen would ever reach Europe. Of the five or six specimens that have, from time to time, come within my observations, as well as the various means and kinds of food that have been employed to sustain them, I am satisfied that the name, if intended to indicate the food of this creature, is only a delusion.

The first great ant-cater that I remember to have seen alive came to England in 1853. This animal was fed principally upon raw eggs, milk, and the intestines of rabbits; upon this food the animal lived for several months, but during the whole of this time appeared unhealthy.

In 1866 a fine large adult ant-eater arrived in Southampton and was allowed the free range of a large kitchen garden. The beast was amazingly strong, active, and somewhat dangerous, as he would sometimes suddenly attack and strike with his front claws any one who ventured to approach him. Being alone, I entered the garden to look at him, and, not expecting any mischief, I was much astonished by the suddenness of his attack, and had to beat a retreat in double quick time to save my clothes and, probably, my skin from being torn off. He fed freely upon thin worm-like strips of flesh (raw beef),

with occasionally arrowroot, milk, and the yolk of eggs, consuming about 21 oz. of food per day. This animal was afterwards sent to the Zoological Gardens in Hamburg, and lived a very long time on the food mentioned above.

In 1867 a fine young female was presented to this Society by Dr. Palin, and on its arrival at the Gardens was in rather poor condition, having been fed principally

THE GREAT ANT-EATER.

upon milk and eggs; but strips of raw beef and mutton, however, were substituted, and upon this food, with the addition of a little bread-and-milk, the animal soon increased in size and strength in a very remarkable manner. Improbable as it may appear, I found this animal somewhat partial to ripe fruit, particularly soft pears and apples, which she would eat with apparent relish if

mashed up into pulp, and I have no doubt that she would have inserted her long snout into a ripe melon and eat out the contents. In fact, I very much doubt the statements, made by the early writers, of the habits and food of this singular animal, they being probably deceived or misled by the woodpecker-like tongue of this animal into the belief that it was intended for the capture of small insects. For my own part, I have tried them with the most tempting insect food at my command, namely, mealworms, and have failed to get these creatures to eat them, although the worms were sometimes mixed with milk and honey.

When the animal was scratching and burrowing in the earth I have seen him thrust his long nose suddenly into the ground and draw forth a worm which he would eat, but in no instance have I observed him allow his long and delicate tongue to hang out in the dirt or remain protruded from his mouth for more than an instant, unless it was thrust into some sweet and glutinous fluid that he was engaged in licking up.

AARD-VARK, OR ANT-BEAR.

(*ORYCTEROPUS CAPENSIS.*)

The additions that are constantly made to the vast collection of animals in the Zoological Gardens furnish a good proof of the increasing efforts made by persons in various parts of the world to promote the success of the Society's undertakings.

In many instances the Society owe to the energetic perseverance of their corresponding members and travelling friends the obtaining of species which are rare and difficult to keep. Another and very important matter to be taken into consideration is the kind assistance so freely rendered by most of the officers of the mail and other steamers, by whose aid many animals reach this country in so short a time that they arrive in perfect health; whereas a long sea voyage will constantly render many animals weak and sickly, partly from want of proper food, and also the close confinement and neglect of cleanliness, consequent on being on board ship.

It was with much pleasure I observed the arrival of a second aard-vark or ant-bear (*Orycteropus capensis*), and this time the animal's sex is of considerable importance, the former one being a male, this last individual an adult female. The novelty of the appearance of these singular-looking animals is well deserving of notice to show the progress made in the mode of feeding and treating rare and difficult-to-get animals, and bringing them home to

this country in good health. To obtain these creatures in the first instance is a task of great difficulty, as they have to be dug out of the earth, and, in many instances, after many days' toil, the hunters fail to capture them uninjured, and frequently the dogs employed in the pursuit are killed, or so mutilated that they are obliged to be destroyed; and it not unfrequently happens that after the animal is caught, it is so wild and ill-tempered, that it refuses all kind of food, and dies in a few days. The mode of attack is by striking with its fore-feet, the claws of which are long and powerful, with sharp cutting edges, and are capable of inflicting very dangerous wounds upon any animal within reach. The ant-bear, although a heavy animal, strong, and doubtless when enraged a very awkward customer for a dog or other enemy to attack, is a trifle when compared with the more powerful and active ant-eater of South America (*Myrmecophaga jubata*), whose enormous strength renders its attack so much to be feared by the Indian hunters, whose dogs are frequently killed by this beast. The determined courage displayed by this shaggy brute when it attacks a man or other animal has been more than once witnessed by the writer, who upon one occasion narrowly escaped being very severely handled by a full-grown adult male of this species. The mode of attack is by a sudden rush upon you; his spiny hairs all erect, and the little fierce eyes protruding above his long and tapering snout, he utters at the same instant a loud, savage, and half choking, roaring bark, and strikes with wonderful swiftness at the object with his powerful fore-foot; the strong hooked claws bringing the animal thus caught between his fore-legs, and instantly tearing open the abdomen or lower parts of the body with his incredibly sharp hooks, the points of which are so well preserved by never coming in contact with the ground while the animal

is walking, in consequence of their being turned inwards and upwards. The strength, and so to speak the hardness of these and many other wild animals, and the little impression that a man can make upon them unless armed with some deadly weapon, is a thing few persons not experienced in these facts can possibly credit or imagine. Their tenacity of life is often the cause of their suffering a frightful amount of torture from the savages who capture them, who sometimes mutilate them by cutting off their feet to disable them, and keep them alive for days in order to have them fresh for eating.

These so-called ant-eaters are, however, not so insectivorous as they are generally supposed to be, as will be seen by the fact that the captive animals are fed upon raw meat, and of this each of them will consume about three pounds daily; the South African species not only eats raw flesh, but a small quantity of grain, and this its remarkable molar teeth are well suited to grind on their flattened crowns.

SUGGESTIONS FOR FEEDING AND KEEPING THE AARD-VARK.

Having experienced the great difficulty of finding suitable food for the *Edentata* generally, I am able to state that, after many experiments, I have discovered the most appropriate food for the great ant-eater of South America, food upon which that animal has not only lived in perfect health, but has also increased in size in a very remarkable manner. This result induces me to believe and expect that a similar food and mode of treatment would be likely to meet with success in keeping the African species. I would therefore advise that this latter species be fed upon raw flesh (perfectly fresh); it is most

important that the animal from which the flesh is taken should have been recently killed. The flesh should be cut into long strips, about the size of a goose-quill, each bit being given or introduced by one end into the mouth, the other end being held in the hand. Another successful method is to mince the flesh in the same manner as sausage-meat, and mix it with scalded bread-and-milk, to which may be added raw or boiled eggs; only the yolks of the latter are to be used.

I have heard, upon what I think good authority, that one of these animals lived three or four months in captivity upon the fresh blood of sheep and bullocks, with which was mixed a little fine oatmeal. It may, therefore, be possible, by varying the food with the above, and by the addition of a little honey and the entrails of poultry well washed and cut up, that the aard-vark may be kept alive. It is difficult, at first, to get these animals to take to the artificial food, but with very great perseverance, a good supply of patience, and by thoughtful care, it is to be accomplished.

But if the feeding be entrusted to servants, who seldom take much interest in such things, I fear the result would be, as heretofore, useless.

ARMADILLOS.

The armadillos belong to a family of the Order *Edentata*. An exemplification of the difficulty experienced by the scientific zoologist, in finding a suitable nomenclature under which to arrange and classify the various orders of the animal kingdom, is aptly given in the Order *Edentata* (or toothless). For the largest species of armadillo (*Dasypus gigas*) is furnished with a larger number of teeth than any other quadruped (mammal), the teeth consisting of upwards of ninety molars. Notwithstanding this anomaly, a more convenient or less inconsistent place for arranging the genus *Dasypus* has not been found. Armadillos have the appearance, at first sight, of reptiles; the horny skin, covered with bands and plates, strikes the observer as bearing a resemblance to lizards or crocodiles, but more particularly to tortoises; and long since some of the ablest anatomists pointed out strong and well-marked characters of agreement in the structure of those distantly related forms. Notwithstanding the apparently close similitude in some of the structures, the idea that the affinity is very great cannot, for one moment, be entertained; they may be nearer than the tortoise-shell cat to the tortoise. However many resemblances can be found, perhaps a large number of well-marked differences can be distinguished: the structure of the bones themselves, where a section is examined under the microscope, presents at

once an unmistakable and well-defined diversity. The late Professor Quekett first pointed out the structure of the tissues of the bones of reptiles, as distinguished from these parts of birds and mammals, the warm blood. The mode of reproduction, and suckling the helpless and blind young, exhibit, in the armadillos, a wide contrast with the egg-laying, cold-blooded tortoises, whose young, like all other reptiles, are produced in a perfect condition, and are able to provide for themselves as soon as they are hatched. It would be useless to proceed calling attention to many other differences, for many missing links will have to be found and supplied ere the armadillos can be united to the tortoises. A little three-banded armadillo (*Tolypeutes conurus*) that was exhibited in the Zoological Gardens, was noticed to walk on the points of the long claws of its fore-feet, and that mode of progression suggested to the observer the probability that some of the monster edentate animals known only by their fossil remains, progressed in that manner instead of tree climbing, as they have been represented by their describers, who could not find the bones of the feet and toes suited to walking on the ground. The great ant-eater (*Myrmecopha jubata*), another of the Order *Edentata*, has the toes and claws of the front feet turned inwards and upwards, and thus walks on the outer side of the feet; it is most likely that had this animal been found in the state of, and known only as, a fossil, we should have regarded this formation of the feet as admirably adapted to climb trees, a habit up to the present time unrecorded by personal observation of the living creature, although in the British Museum we have a familiar example of that supposed accomplishment in the Monster Megatherium, a far less likely beast to ascend the trees of the period than the great ant-eater of our day.

Armadillos are in great request with the itinerant showmen, who announce the animal as the "Wonderful Hog in Armour;" of course the picture outside the show rather flatters the animal in size, and occasionally quite equals the famous glyptodon, which, according to Professor Owen, rivalled the rhinoceros in dimensions.

Armadillos are said (in almost every book that has been published) to feed upon roots, fruit, and other vegetable substances; our experience, however, has proved that these animals are feeders upon animal substances, if not entirely so, to a great extent. One fact at least would lead to this conclusion, they have become amazingly abundant in the neighbourhood of the slaughtering places of South America, feeding on the offal caused by killing a large quantity of cattle, and their vast numbers incline one to believe that this food is well suited to them. In captivity they feed freely on animal food, such as flesh, worms, or insects, small birds, eggs, lizards, and snakes, rejecting fruit and vegetable substances.

They burrow into the earth with wonderful swiftness, and most frequently under the roots of trees, rendering it most difficult to dig them out. Their movements on the surface of the ground are quick and lively, and generally at twilight, being nocturnal rather than diurnal in their habits. They produce two at a birth, which are at that time helpless and blind, and are suckled for some time.

Armadillos are amazingly strong and muscular, consequently, taking size into account, they are of great weight. The flesh is much sought after, and considered delicious eating.

REPTILE HOUSE.

The old reptile house became unfit for the safe keeping of the lizards, venomous snakes and other reptiles that were deposited therein. It is very fortunate that no serious accidents occurred by reason of some of them having made their escape. The practice of feeding some of the snakes upon tame white mice was looked upon by many of the lady and children visitors as cruel. When I was spoken to, and written to, on the subject I took advantage of a suggestion that the common brown mouse, of which we had more than enough, would answer for feeding purposes quite as well as white ones. I therefore had mouse-traps set in all directions, and supplied the wild instead of the tame white ones.

I soon discovered my mistake. These wild brown mice, if not killed directly, were soon engaged in gnawing their way out of the case, and the same opening which they made also allowed some of the snakes to follow. The tame white mice seldom or never attempt to gnaw their way out. Years after the old reptile house had been disused, harmless snakes that had escaped in this way were found in the mill-room underneath the old house. They had doubtless lived upon the rats and mice that swarmed in this place.

The keeper of the reptile house came to me one day and told me that he had missed one of the cobras. I examined the empty cobra case, and found a mouse-hole

in the corner leading into the water-viper's case. The water-viper appeared to have lately fed and to be well filled out, and I had some misgivings that the lost cobra, in creeping through the mouse-hole, had been caught and swallowed by the water-viper.

The fear, coupled with the anxiety of thinking that so dangerous a serpent as a cobra was at liberty, caused me to determine to settle the question at once. I had the water-viper killed, and, upon examination, found the nearly digested cobra, which was a great relief to me and all the others.

TORTOISES.

WATER-CARRYING TORTOISES.

I REMEMBER reading some time since an account of the water-carrying tortoises, a specimen of which was exhibited at the San Francisco Academy of Sciences. "This tortoise is a native of the arid regions of California and Arizona. On one being dissected it was found that it carried on each side a membrane, attached to the inner portion of the shell, in which was about a pint of clear water, the whole amount being about a quart. Professor Cox was of opinion that the water was derived from the secretions of the giant barrel cactus on which the tortoise feeds. This cactus contains a great deal of water. The tortoise is found in sections of the country where there is no water, and where there is no vegetation except the cactus. A traveller, suffering from thirst, could, in an emergency, supply himself with water by killing a tortoise. These tortoises are oftentimes attacked by foes both for their water and for their flesh. It was generally admitted that it would be useful if the habits and peculiarities of these animals could be noted, and some trustworthy information, as to how they collect and secrete the water, obtained."

During the last thirty years I have had the opportunity of dissecting, I may say, hundreds of tortoises, and, upon opening the body, the commonest condition most fre-

quently found was the enormous accumulation of fluid. The animals apparently had dropsy, from the flaccid and soft condition of the flesh and the filling up the whole of the body with water; in fact, they all appeared to have been in a dropsical condition, which was the cause of death.

HISTORY AND TREATMENT OF TORTOISES.

The tortoise is as little known, understood, and cared for as most of the reptile tribe. Quiet and harmless, unsuspected of having evil propensities, and not being feared in the least, they pass slowly on their way, without creating much interest, or attracting much attention. They are, nevertheless, of much importance as an article of food, and are much sought for, more especially the kinds that are aquatic, by the natives of the countries which they inhabit. The eggs of tortoises, both land and water, are collected and sold in enormous quantities during the breeding season. The eggs of tortoises hatch without the aid or assistance of the parents, who deposit them in situations best suited to their development; the young ones have therefore to look out for themselves. They sometimes, however, hatch under very different conditions, as the following incident will show:—An officer who was engaged in the Russian war, while in the Crimea, found some small, round, white eggs; not knowing the animal that had laid them, he carefully packed them in his pistol case wrapped in wool. Judge his surprise, on unpacking them in England, to find his pistol case contained several living water tortoises that had hatched out during the time he had been travelling home. These animals, of which there are many genera and various forms, differ in habits, food, and mode of life.

The food of the land tortoises consists, principally, of vegetable substances, leaves of plants, fallen and decayed fruit, and fungi of various kinds.

Many of the water tortoises feed upon dead fish, insects, or other animal matter. Some of them, however, are vegetable feeders, while others there are that feed partly upon vegetable and partly upon animal substances.

Slow as the movements of tortoises generally appear, the species that live upon animal substances, and have to capture their prey, are quick enough, when so engaged. The snapping turtle, so called, is well known, and is much to be feared in the localities in which it abounds. Many of the smaller kinds of water tortoises are expert fly-catchers; swimming about close to the surface of the water, they capture, by suddenly darting forth the head, assisted by the long neck, any insect or other living creature within reach, with amazing rapidity; the flattened feet give them great swimming power, by the aid of which they move about in any direction with ease and dexterity.

The tortoise is about the last creature we should have suspected capable of, or have charged with, a display of anger, or of possessing a pugnacious disposition, yet, we learn, upon undoubted authority, that battles among them, in their native haunts, are not uncommon; they meet and fight by biting and butting at each other like rams, backing a short distance to give greater force to the blows. These fights, like some of the other proceedings of the tortoises, are of considerable duration, frequently lasting all day. They seldom appear much the worse after an encounter, still it shows a determination on the part of these cold-blooded animals to resent a possible injury or offence, or probably to drive off an intruder upon their domestic felicity.

The age to which they are said to live is probably merely fabulous. It is, however, certain that they grow slowly, and that they attain a good old age. Some species are of immense size. The measured length of the outer shell of a large Indian tortoise (*T. elephantina*) was found to be 4 ft. 3 in., the circumference 6 ft. 6 in. This animal is said to have weighed 400 lbs., and as the appearance of many animals that grow to a large size lead us to regard them as being very old, we are induced to place faith in their antiquity. However, be that as it may, it is not many years since it was generally believed that the rhinoceros required fifty years to complete its growth, and would then live till it was upwards of two hundred years old. We now know that those accounts were fables, as the rhinoceros is fully grown at the age of eight or ten years, and that it most probably dies of old age before it has seen forty summers.

Large numbers of the common tortoise (*Testudo græca*) are brought to London, and are offered for sale about the streets by the costermongers; the price varies from four pence to two shillings each. It is great fun to witness the artful dodges practised by such dealers in well-known, but little understood, animals; the strange questions of the buyers, and the quaint answers of the vendors, are as remarkable as they are suited to the occasion. "What are they good for?" asks an old lady. "What do you want it to do, marm?" "Well, my kitchen swarms with black beetles." "Ah!" says the costermonger, "they are dead nuts on black beetles." The tortoise is forthwith paid for and carried off. The next customer is induced to become a purchaser on being assured of the skill of the animal in catching mice, etc. etc., or, should the slightest hint be given of a garden, you are gratuitously informed that

" the tortoise lives upon snails, slugs, and every other kind of varmint."

In hot climates the tortoises do not hibernate or become torpid, but continue to move about, and feed at all seasons. This refers not only to those that pass their lives on land, but also to those that live in the water. In temperate or cold climates, however, the latter leave the water in winter, and retire into holes in the banks or sheltered damp places during the cold season, while the former dig holes in the dry bank or earth, and bury themselves sufficiently deep in the ground or under decayed leaves, etc., in order to escape the cold.

As an instance of the torpidity of these animals we may quote the following fact, viz.:—The curator of a well-known museum of Natural History was sitting one night quietly and snugly in his chair in the fond delusion that the only living creature in the place was himself, when he was suddenly startled from his reverie by the smashing of glass and a loud noise at the far end of the museum; he started to his feet, and, with lamp in hand, rushed to the spot whence proceeded the noise, when his consternation increased on observing some of the newly varnished and labelled specimens of tortoises quitting the shelves and rolling about in strange confusion. The innocent cause of this commotion turned out to be one of the recently-added specimens, which was picked up in a room below as dead, and dried, and was varnished and labelled and placed with the others. It was, at the time of being placed in the case, only in a state of torpor, from which the warmth of the room roused it, and realizing at once the solemnity of its position in being placed in the row with its defunct relatives, it commenced to travel, tumbling off the shelf, as it went on, all the empty and untenanted shells of departed tortoises in its way, much to the alarm of our friend.

My fair readers may be interested to know what kind of animal supplies the material for the beautiful combs and other ornaments formed of tortoise-shell. The tortoise-shell of commerce is produced by a large marine species known to naturalists as the *Chelone imbricata*. The capture of this animal and of other marine species by the use of the sucking fish (*Echeneis*) has been well described by several well-known travellers. It may, however, be of interest to some of my readers to learn by what contrivance fishes can be employed to capture animals that do not feed upon fish.

The mode of proceeding is easily understood by any one having a knowledge of the power possessed by the sucking-fish of attaching itself to other bodies. These fish are kept in tubs and tanks ready for use, and the fishermen upon seeing the turtles floating asleep at a distance, attach a line to the sucking-fish, the sucker of which is on the top of the head. This done, the fish is allowed to swim to the turtles, and it quietly fixes itself by its sucking disc upon the unsuspecting turtle so tightly that the turtle is drawn towards the boat and easily taken.

The flesh of turtles and of most tortoises forms a very excellent and highly nutritious food, and is much valued and sought after by our wealthy citizens. It nevertheless soon becomes distasteful to the Englishman's palate, that is, supposing him to be placed from home and in the country in which turtle in high perfection could be had, and no other food available. He is then, generally, soon reduced to the condition of the confectioner's apprentice, who after the first year could not be persuaded to taste anything that was sweet.

Having sent to Dr. Günther some living water tortoises for identification, the porter to whom they were entrusted

(to keep them in safety) placed them in a glass jar for the night. The curator on the following morning finding them in his room, and not knowing they were alive, filled up the jar with spirits; he was startled, as also were these unlucky dwellers in water, who, for the advancement of science, unfortunately lost their lives by imbibing too large a quantity of alcohol.

THE HABITS OF LIZARDS.

THE stump-tailed lizard (*Trachydosaurus rugosus*) is one of the remarkable forms of the order *Sauria*, of which there are many families and endless genera and species. Many of them abound in tropical countries; they inhabit various localities. Some species live on the dry sandy deserts, while others are always inhabitants of the moist swamps on banks of rivers. They swim with great ease, and are equally at home in the forest, living in the branches of trees. The endless variety of form and habits would occupy too much space to more than allude to one or two small species. *Draco volans* possesses the power of partly flying by the aid of a membrane or extension of the skin on the sides of the animal, this skin being supported by the elongation of the ribs. Others by their sucker-like feet and toes are enabled to run or walk on the ceiling, or up the smooth surface of glass like a fly, the feet of which are also provided with a structure adapted for the same purpose.

Little is really generally known at home or abroad concerning lizards. They are perfectly harmless in themselves, but are invariably much feared and regarded as venomous by all who have no knowledge of them further than from hearsay or from seeing them at a distance. No lizard possesses poisonous teeth or glands, although it is a common belief among the natives of the countries inhabited by them that they do.

These reptiles are remarkable for their great number of species and variety of forms, differing much in habits and food, and being widely distributed. Many of them are of great beauty, both in form and colour; the *Lacerta viridis*, common green lizard, may be quoted as an example of fine form and brilliant colour; and, on the other hand, we have the most repulsive-looking creature in the spiny species known as the *Moloch horridus;* a more hideous creature cannot well be imagined. Many singular peculiarities appertain to the lizard family, some of them being destitute of the external limbs, such as the slow-worms and the grass snakes.

The brittleness of the tails of many species and the parts that have been broken off being replaced by a new growth, are very remarkable.

The tail is used by the monitors and others in defending themselves against, and in trying to escape from, their enemies, and a most severe weapon it proves to be; the strength and power put forth in giving a blow, or rather in slashing or lashing from side to side, or upwards, with this whip-like appendage would astonish any one who incautiously attempted to handle one of these animals in full activity.

The wonderful rapidity with which they move surpasses all belief, and only those who have witnessed their lightning-like disappearance from sight upon being surprised, can realize the quickness of their movements.

It must be impressed upon the mind that the temperature and state of the atmosphere exert great influence over these animals. A lizard that could rush before you, and vanish like a flash of light, in the heat of the sun's rays, would lie apparently lifeless during the cold of the night; heat is life, cold is death, to the lizard tribe. The state

and condition of the animal itself has also much to do with its liveliness.

Some of the species are of small size, never exceeding 3 in. or 4 in. in length; but the larger kinds are said to attain from 6 ft. to 7 ft. in length. Their mode of reproduction is various; many kinds produce the young alive, others deposit their eggs in a warm situation, and leave them to hatch out and provide for themselves.

The larger species, such as the monitors of Africa and Australia, feed upon animal food, and their swiftness in moving enables them to capture birds as well as mammals; they are as active in the trees as on the ground, and they devour large numbers of eggs and of young birds.

When one of these lizards finds a nest of eggs the skilful method it has of taking up an egg in its mouth is remarkable. The creature turns its nose upwards, before crushing the shell, in order that the contents may flow down its throat; or should the egg contain a nearly hatched young one, the blood and other fluids are swallowed with the crushed shell and chick; the long forked tongue being thrust far out of the reptile's mouth, licking up on all sides with great relish any particle that may have escaped at the sides of its mouth.

Should a rat or other small mammal fall in its way, the monitor at once seizes it, and like a rat-killing dog, shakes and knocks it about on the ground until it is stunned or killed, and then swallows it whole, sometimes using its claws to free the sides of the mouth from the claws or toes of the victim should they become, as they sometimes do, fixed in that part. The power in the jaws exerted by these animals is incredible, when crushing the ribs and other bones of the animals upon which they feed, and the determined manner with which they

hold on can only be imagined. On one occasion the writer witnessed two large Egyptian monitors pounce upon a snake of about 15 in. in length; both appeared hungry and equally determined to make a meal of the unlucky snake. They snatched, or rather jerked, at each other, keeping tight hold of their victim, one having the head, the other the tail; by a number of convulsive efforts each managed to swallow about half the snake, until the noses of the monitors came in contact, when suddenly the one that had the head part of the snake down his throat, managed also to get the nose of his antagonist firmly between his jaws; then a most desperate struggle ensued which lasted several seconds, and ended by the tail end of the snake being relinquished. It is needless to add that the whole of the snake was instantly swallowed by the successful monitor.

An adventure once happened to myself while travelling. I had with me a small box filled with geckos, a very harmless little reptile, and during my temporary absence from the hotel an inquisitive servant opened the box, and being too much alarmed at the sight and the quickness of the reptiles to close the box, rushed out of the room. The animals, finding themselves at liberty, began very soon to run up the walls of the staircase, to the great alarm, horror, and consternation of every one in the hotel, who believed them to be dreadfully venomous. My astonishment may be imagined on returning, late at night, to find everybody sitting up for me, and giving me a very warm reception. No one had dared to venture up-stairs, the foot of which was guarded by a posse of frightened servants armed with pokers and tongs for fear any of the reptiles should escape to the lower part of the hotel. Had it not been that my services were most urgently required to collect the active little brutes,

there was every possibility of my company being most unceremoniously dispensed with by the enraged tenants of the hotel. The entomologist unused to collecting in countries that abound with these active little animals, is sometimes treated to a sight the reverse of pleasing; on his returning to the tray or board that he has for a short time left filled with beautiful butterflies, all pinned out to dry, he finds only the pins, the lizards having eaten up the already captured insects.

The power possessed by many lizards of changing colour, particularly by the iguanas, that pass much of their time in trees, is only known to those who have made these animals a study; they do not vary their colour perhaps so much as the well-known chameleon, but the change from the most lovely bright green to the dull wood-brown, is of frequent and almost constant occurrence, depending probably upon the altered situation from the green leaves to the branches or trunk of the trees upon which they feed. The large lizards, called iguanas, of South America, feed principally upon fruits and vegetable substances. They occasionally do much damage to the plantations, and are particularly fond of the kitchen-garden, committing great havoc among the much-prized vegetables grown for the table. In some instances during their visits they have so completely eaten up every particle of green food, that what appeared the day before a well-stocked garden, looks the next like a scrubby stubble field, every vestige of the green growing crop having been eaten by the iguanas. These animals, however, are much sought for as an article of food, and in their turn repay for the damage they occasionally commit. Their flesh, excellent in flavour, highly nutritious and wholesome, is cooked in various ways, being either broiled, boiled, roasted, or made into soup.

CHAMELEONS.

To speak of the chameleon is to speak upon a subject somewhat analogous to the conjurer's inexhaustible bottle; the more it is handled the more there is to gain from it. There is so much connected with these animals not generally known, and they are brought to this country so frequently, and kept sometimes as "pets," but oftener on account of their remarkable form and singular habits, that a few remarks upon them may not be without interest to those persons who possess specimens, in enabling them to preserve them alive, and by so doing to become acquainted with their habits and economy.

The cause of change of colour in the chameleon appears to be imperfectly understood, although so much has been written upon this subject. Many other animals exhibit the same power, but to a more limited extent. It is highly probable that the change may be partly involuntary, because some fishes, reptiles, and insects, if removed from one situation in which their colours assimilate to the surrounding objects, to another to which they at first form a strong contrast, they will in a very short space of time adapt their colours to that of the new position, this change affording probably "a protection from their enemies." This object of the change of colour may be questioned in regard to the chameleon, as that reptile may be free from enemies. Again, the power of assimilating its colour to

the branches or leaves of trees and shrubs may be useful in another way—viz. to prevent the flies or other insects seeing the danger to which they are exposed in approaching within reach of its treacherous and sticky tongue. As the chameleon cannot follow its prey, it has to wait until it comes so near that the tongue will reach it, and everything that would aid in accomplishing this act is fully in accordance with all we know respecting the means possessed by other animals in obtaining food; and the question of the usefulness of the change of colour will perhaps for ever remain beyond our understanding, like the mode itself of changing colour. Many striking instances of insects assuming the colour of the situation in which they fix themselves in the chrysalis state have been brought to notice, they becoming white, red, black, or green, according to their position during their torpid condition. Some butterflies and moths have the form and colour of dead leaves. The latter are sometimes coloured and marked like the bark of trees on which they are found. Some caterpillars and insects are in the shape of bits of dead stick. All these and other modes of disguise given to various classes of animals are no doubt wisely ordained to serve a designed end; so wonderful and perfect do they appear that they are beyond human comprehension. The change of colour in frogs, especially the "little green tree-frog," is very noticeable, varying from the most brilliant apple-green to nearly jet-black. Toads, and many of the lizards, particularly the iguanas of tropical America, are all changeable. The latter animals are perhaps quite equal to the chameleon in the power of changing colour, but they have not received the same amount of notice or attention; the variation being chiefly from the most beautiful bright green to a dull, pale brown, both colours well adapted to enable the animal to escape unobserved in

the green foliage or on the brown trunks or stems of the trees on which it often remains motionless and unseen, so completely disguised is it by its assumed colour. The food of the chameleon consists of insects, such as beetles, flies, and caterpillars, in fact almost any small living creature. The mode of feeding, which is by darting forth with the rapidity of lightning its long tongue, is so well known that it is only in passing we mention it, but it would be well to say something about the means of keeping in our climate the animal during the winter months.

The reptile requires to be kept in a warm place, and exposed as much as possible to the sun's rays. The food may consist of common black beetles, so troublesome in kitchens, which can be obtained by using the ordinary beetle-trap by which they are caught alive, and make a capital meal. A few gentles, which can always be obtained from the fishing-tackle makers, and which, placed in a small dish of sand in the glass case, soon hatch out from the warmth of the room, and produce a good stock of flies. In winter, in the event of these methods failing, the well-known mealworms can be obtained all the year round, and these, put into a glass or well-glazed saucer, will be taken by the chameleon.

A little sugar-and-water in a dish is also desirable, as it frequently drinks or thrusts its tongue into the fluid, and seems to like it. Another disputed point has been argued with considerable warmth in reference to the mode of reproduction; some said that the chameleon lays eggs, which are afterwards hatched, while others declared most positively that they produce their young alive; thus, as in the old fable, the controversy became hot, and was carried on until the patience of all parties was exhausted. In truth, they were both, at one and the same time, quite

right and quite wrong—for this simple reason, that the chameleon sometimes lays eggs that are afterwards hatched, while at others the eggs are hatched before they are laid, and consequently the young are produced or born alive.

THE EXTRAVAGANT FROG.

STRANGE as it may appear, it is nevertheless true that a gourmand of a frog may sometimes have the opportunity of enjoying an expensive meal at the cost of the lives of his friends and near relations. In illustration of this I will give an instance. An American frog dined at the expense of the writer, who had to pay in money, while the near relations, cousins I may call them, of Mr. Frog, paid dearly by losing their lives upon the occasion.

In England and on the Continent a dinner for one, not including wine, etc., should not exceed five or six shillings, but the idea of food costing this sum being swallowed, at a single repast, by an epicurean frog, seems quite out of all reason.

The facts on this occasion were as follows:—Having purchased about a dozen of the pretty fire-bellied toads (*Bombinator igneus*) from Saxony at a shilling each, I had them placed in a large glass case in which a happy family of frogs, etc., were supposed to be enjoying each other's society. This state of bliss, however, was not to be shared by my Saxon friends, for whom the American frog (*Rana catesbiana*) exhibited a great fondness, distending its jaws,—which reminded me of the not unfrequent expression of kind mothers who say to the baby, "I could eat you, you darling," but, with this difference, our Yankee frog commenced immediately to swallow, "all

alive and kicking," the unfortunate Saxony toads, and had actually polished off at least six of them before the discovery of this gluttony on his part was made. How many, considering their small size, he could have managed still remains unknown. The Yankee frog appeared like a Danda among the toads, and doubtless would have finished the dozen without difficulty, like oysters, had they not been rescued from the neighbourhood of his capacious jaws.

THE INDIVIDUAL DIFFERENCES OBSERVABLE IN THE SAME SPECIES OF ANIMALS.

An unfortunate shipwrecked sailor cast on shore upon the coast of Africa, and surrounded by a crowd of negroes, would not be able to distinguish or see the slightest difference (except sex) among these naked black people; they would all appear to him alike, thick-lipped, woolly-headed, and black—Sambo, Congo, and Jumbo "berry much alike, specially Jumbo." It would not, however, be long, should he remain among these people, before he would be able to recognize the different individuals, and the marked similarity that at first struck him would soon disappear, and Sambo would appear totally distinct from Congo and the rest, not only in his appearance, but in disposition, manners, etc. Much in the same way, if we meet a flock of sheep of any particular breed they appear as alike as possible at first sight; but upon careful examination they will be found to present well-marked and endless differences, even to an ordinary observer; but ask the shepherd who has had the rearing and attending to the flock, he knows every sheep, and can distinguish them perhaps as readily as the huntsman can name every hound in his pack.

Now a pack of hounds to the stranger appears so much of the same size, colour, and form, that persons un-

acquainted with the subject would doubt the possibility of each one being readily distinguished and called by name at sight; yet such is the fact, and it only requires a little care and attention to notice not only peculiarities in features, but marked differences in *habits, disposition, temper*, and mode of action. How many thoroughbred and carefully reared and trained hounds are found to skulk and avoid the hard work of the chase, and look out for the most favourable opportunity of sneaking out of sight, and a hundred other tricks and dodges resorted to by cunning dogs, both old and young. It may be said that the dog and the sheep being domesticated animals, it is unfair to introduce them to illustrate a subject that is more strictly intended to show the individual differences that exist among wild species of animals. This must be admitted to be so far true, and the only object of their introduction is to point out that in the animals of pure breed, and consequently as much alike in appearance as wild animals, when closely examined are found to exhibit marks of distinction, not so easily observable on account of the difficulty of the examination of wild animals, and not because they do not exist. As an example, we may say, for instance, if the living lions to be found in the numerous menageries and Zoological Gardens in Europe had their portraits painted, these monarchs of the forest (as they are commonly called) would be found to differ in features and expression quite as much as the emperors, kings, and other rulers of this our savage world.

But to return more closely to the subject under consideration, let us take the various kinds of wild birds that are reared by hand from the nest; it would be natural to expect that the five or six young birds hatched from the same parents and fed at the same time, and upon the same food, treated alike, and kept together under the

same circumstances, would grow up alike, or nearly so. Ask any one who has had years of experience in this matter; the answer will be, almost without exception, that the greatest difference of *disposition*, *temper*, and *ability* will occur. Some become wild and useless, others altogether the reverse, perfectly gentle and attentive, and capable of being taught a variety of tunes and other accomplishments. These remarks apply particularly to song birds, but among other kinds of birds and beasts they are equally applicable.

This, it will be observed, is the result of rearing birds upon unnatural food, and under unnatural circumstances and conditions; let us see what happens to the wild caught birds. We will take the well-known and charming songster the Nightingale, large numbers of which arrive in this country in the early part of April, and are easily caught. The differences observable among these fresh caught birds are most extraordinary. As a rule they are placed singly—each bird in a small cage—with the front with thin paper or white calico outside the wire bars. This is done to prevent their being alarmed or disturbed by any one looking at them or going near the cage. They are, of course, supplied with plenty of food and water.

As the male birds arrive some days earlier than the females those caught as soon as they arrive are much higher in value on account of their song. And under the treatment before mentioned many begin to sing a day or two after they are captured; this is by no means, however, constant, for, in spite of every care and precaution, they will sometimes exhibit a restless determination to escape from captivity, beating and dashing about in the cage night and day, knocking the feathers off the head and face by incessantly thrusting the bill between the wires of the cage, breaking and destroying every feather in its

wings and tail by fluttering and jumping about, almost living without food, or throwing the food about on the bottom of its cage, such determined resistance does this little bird sometimes display to being kept a prisoner; yet, on the other hand, we find other individuals of the same species, caught on the same day, in the same locality and under the same circumstances, and treated alike in every particular, exhibit a mild and gentle disposition, take readily to the food offered, soon become perfectly tame, come on the hand without fear, and sing night and day for many weeks. Such are the well-known facts to all persons who have taken the pains and trouble to keep in a state of captivity this much-admired and well-known songster.

A remarkable and strikingly illustrative example of this kind is well known to the writer. With reference to the wonderful performing monkeys so frequently exhibited in the streets of London and elsewhere, few persons are at all aware that the men who exhibit these intelligent and well-trained animals have had nothing whatever to do with their first teaching. The fact is that the teaching of performing monkeys is a profession, and the persons most skilful in the art have a school for the training and teaching the various kinds of performance these animals are intended to go through in after life.

The secrets and mysteries of this profession are most carefully guarded, for the business is one of great profit, for a monkey whose value when untaught is but a few shillings, when properly trained and well educated, will sell readily for £50.

It is a well-known fact that many monkeys are incapable of being taught, and it not unfrequently happens that the teachers, after having purchased a stock of young monkeys on their arrival in this country, soon discover

the mental inferiority of some of them, and will sell them at once if possible, or exchange them away, at half their original cost, not wishing to lose time or take any further trouble with these dull or wilfully determined and obstinate individuals. It would fill a volume to relate the queer and funny artful dodges used by the teachers and their pupils, in the school for monkeys; but it would be a breach of confidence to do more than state as a fact the existence of such establishments in this country.

Now this illustration of individual peculiarity can, and may, fairly be applied to all animals that have the power of showing or displaying their will, temper, or disposition, or whatever power we may please to call it. It would be endless to attempt to multiply instances of this resistance, or otherwise, so constantly met with in the endeavours to convert to our use the powers of the lower animals. How often we fail to reduce to subjection many of the wild caught animals, who die rather than submit to a treatment that succeeds to perfection with others of the same kind; we are therefore unable to deny their individuality. If it were not for this, probably many of the adventurous of a species would not shift their native homes and become like ourselves wandering migrants, seeking new homes, new food and circumstances; and in this way, the will and disposition already changed may lead to other changes, both in size, form, and colour. The endless differences we find in nearly-allied creatures have been used most freely to multiply the number of species in all our Natural Histories. Many of these may perhaps, in after time, be found to be the changes only resulting and arising out of the conditions that have produced them. Progressing in discovery, each little fact brings forth new ideas, and opens up a fresh field of thought. Whoever dreamed one hundred years ago of seeing such a marvellous display of

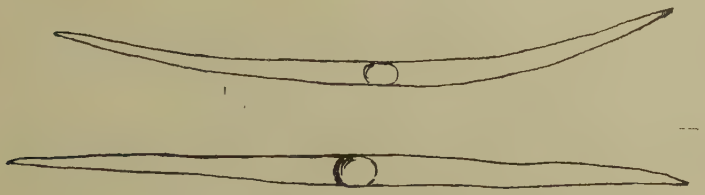
skill and care to bring before the world the true and faithful representations of the nervous, digestive, and other organs of the common blow-fly? Why can this humble individual require to be so well furnished with these structures, at one time thought to belong only to creatures of a much higher order? Have we not been shown that this little fly has a brain and nervous system most complete and perfect in its way? Has, then, the smallest fly this same kind of organization, and which we have not yet made microscopes sufficiently perfect to discover? Few persons would be able to distinguish one flea from another, but the proprietor of the exhibition of the "industrious fleas" knew each individual perfectly, and called them by different names, alleging also that the fleas differed much in disposition and temper, a fact that those who have had the experience of meeting large numbers of them will not doubt.

DIFFICULTY IN KILLING SOME WILD ANIMALS.

In reading the endless accounts given by sportsmen of their successes and failures in hunting wild animals, it is often a matter of surprise that a powerful animal should drop dead on receiving the first bullet; it also seems absurd to read of an enormous expenditure of ammunition without any fatal consequences. It is not difficult to understand the cause of these different results, if we consider how frequently the bull's-eye is missed by a very good shot, although he takes a deliberate aim at an immovable target. In shooting wild animals no dependence can be placed upon the movements of the beast, no time must be lost, and what may be termed the bull's-eye in the animal is concealed inside the body. It becomes a matter of chance that the exact vital spot is hit, therefore it is only by a lucky accident should the animal fall to the first bullet. Of course much depends upon the knowledge and skill of the sportsman who knows the most vulnerable part, hence we find a powerful beast sometimes killed by a single shot, while, on the other hand, an equally fine animal is riddled with bullets without being at once disabled; although it generally gets away and most assuredly dies a lingering and miserable death.

I give here an illustration of how a round hole can

be cut out of the hide of an animal, by making a long incision and rendering this of an oblong shape; the skin



REDUCING BULLET-HOLE.

can be sewn up, leaving on the outer surface a slight trace of a long cut, only the hole being completely done away with. There are also other means of hiding damages.

THE REASONING POWER OF ANIMALS.

If a collection could be made of the thousands of accounts that have been written and published in which animals have been described as exhibiting undeniable proof of sound and good reason, there would still remain in the minds of a very large number of persons a grave doubt as to the veracity or accuracy of the observers and writers of these statements. It is a natural consequence for persons fond of animals, and who keep pets, to attribute to them an amount of intelligence which no other person would be able to discover in them. It, therefore, appears to me to be simply a matter of individual opinion in all cases of the kind, and there remains, according to my idea, only those persons who are well acquainted with animals, and who have many opportunities of arriving at a correct decision, that are in a position to offer a fair and impartial judgment upon the subject. The numerous instances which have come under my observation during my long acquaintance and constant attention to the wants and habits of animals, have enabled me to satisfy myself beyond all doubt, that nearly all animals possess the power of reasoning, such power differing in degree from man until, in the lower forms of animal life, no vestige can possibly be traced.

There can be no doubt that in those animals immediately associated with man, observing *his habits* and *requirements*,

this power becomes developed in a much greater degree than it does in those animals which are in a wild state; at least when they are kept in captivity, or in a domesticated condition, we have a much better opportunity of observing and judging whether they possess the faculty of reason, hence the endless anecdotes and stories told about them.

NORWEGIAN PONIES.

During the time I spent in travelling in Norway I was much struck by the remarkable fact that a very large number of the ponies were of a dun colour, exhibiting striped markings about the legs, very similar to the markings on the legs of zebras. This was most conspicuous in the infant or foal state. Not only were their legs so striped and marked, but most of them showed a dark line down the centre of the back; many of them had also shoulder stripes, like donkeys. I have counted on some individuals as many as three of these shoulder stripes. In the common ass these stripes upon the legs are not unfrequent. My idea, for many years, has been that the origin of our domestic horse must have been by the commingling of some striped animal of the equine form, and that the race of ponies in Norway is of very ancient breed, in which the tracing of the origin has not died out.

Until of late years horses were not usually imported into Norway.

Travelling in that country is safer and easier with the native ponies than with larger and more powerful animals. I can only say that the ponies and the people are to be admired for their gentleness and good behaviour. A whip or stick is not necessary, and is not allowed to be used by the owners of these ponies. These creatures are so tame that the children almost as soon as they can run fondle

them and crawl about under their bellies. In travelling through Norway the pony is changed about every eight miles at a farm-house, where an entry is made in a book kept for the purpose of reference. The traveller's name is recorded, so that in case of delay or other circumstances he can make a complaint against the farmer or other person concerned. One important thing is for the traveller to learn the sounds uttered by the driver, as the ordinary language used by Englishmen for stopping or making the animal go is quite unintelligible where a Norwegian pony is concerned.

HYBRIDISATION.

THE arrivals at the Zoological Gardens present a most remarkable variety of species belonging to many different orders of the animal world. This diversity of forms and species arriving together suggests the thought that hybridisation may not be of uncommon occurrence among animals that are deprived of their liberty and kept together under very unnatural and artificial circumstances, that the crossing and mixing of different species of animals is by no means of rare occurrence, and many very interesting and curious facts have become known in consequence; I therefore intend to devote a portion of my space to a consideration and explanation of many of the most remarkable instances of the breeding of hybrids, and the various kinds of hybrids known to reproduce their kind, for it is not generally believed that hybrids or mules are capable of reproducing. That such is most frequently the case cannot be doubted, but as I shall be able to show that a large number of well-authenticated hybrids have reproduced, and continue to reproduce, it is a subject of considerable importance, and well deserves the attention of all persons who have the opportunity of ascertaining facts, and carefully recording their observations upon this matter. It is a difficult and troublesome task to collect reliable information, rendered especially so by the want of knowledge so common among the great mass of persons who have been led to believe in the utter uselessness of

attempting to breed with what is generally called a mule, which is regarded as a sterile or barren, and, therefore, for breeding purposes, a useless or worthless animal. As, however, I shall bring forward only those cases in proof of which no possible doubt can exist, I hope to establish firmly in the minds of my readers that many of the animals resulting in the union of distinct species are capable of reproducing and continuing their race.

What is a species? What is a hybrid? With the former question it is necessary to first consider, or at least to make an attempt to define the meaning of the term species, before we can enter upon the second inquiry.

The word species means a single race of beings; but to avoid a too lengthy dissertation I will simply say that animals found in a wild state, differing sufficiently from all others in form, colour, size, marking, habits, voice, and other distinguishing characters, are recognized by persons who, by study and observation, have attended to those characters, as separate species. Such persons are, and must be admitted as, the only authorities who can decide upon any differences, and as being capable of fixing names to the animals distinguished as of different species.

Certain animals, hereafter to be mentioned, which are described and admitted by all the most reliable authorities to be of distinct and well-known species, have, from time to time, come together, and the result has been offspring, commonly called hybrids, mules, or bastards. The reason why the animals of a mixed species are not common, and, therefore, are not frequently found in any large number together, is accounted for by the fact that they rarely have the opportunity of reproducing their kind. Another reason is that they are so generally regarded as unable to reproduce that few persons think of attempting to breed them. A still more potent reason will be found in the fact that a

general antipathy exists in opposition to keeping a (so-called) mongrel race of any animal.

In pointing out the best known hybrids that are, and have been, prominently brought before the public in the shape of birds, and which are, and have been, of small size, I will remark that any person who has paid but the smallest attention to the subject, cannot fail to admit that a goldfinch and a bullfinch are two well-marked and distinct species, and that these birds have frequently bred together and unmistakable mules have been the result. The mule goldfinch more frequently breeds with a female canary, and the latter bird will breed freely with several well-recognized and distinct species of finches.

It is perfectly true that in a state of nature wild animals of distinct species rarely interbreed. A few well-known instances of such a thing happening are, however, recorded upon the most trustworthy and unquestionable authority. But the object of the present remarks is to elicit closer observation, and cause more attention to be given and more experiments to be tried by competent persons who have the opportunity to investigate this hitherto neglected subject.

In France the breeding of the different kinds of game birds, mostly of the family of the *Phasianidæ*, and the crossing of the various species with the intention of testing the kinds that produce fertile hybrids, are now attracting considerable attention. It has already been proved that several well-marked species when bred together produce fertile hybrids. In other cases, in which the parents belong to genera that are far removed, such as the pheasant and common fowl, the result has been a barren or sterile offspring, and this is a very reasonable result, because the difference between the common fowl and pheasant is so great that they have always been considered

generally distinct, and it may be regarded as a fair indication of the value of the generic distinction that their union should produce sterile offspring.

It may be remarked that by far the larger number of instances of hybridisation that can and will be brought forward are among the *Gallinæ* and *Anatidæ*, and the reason is obvious, as these two orders of birds are those most frequently kept in a semi-domesticated state, and consequently the different species are most frequently crossed by accident, or by the intention of those who keep them under these conditions.

Many well-known instances of different species of waterfowl have produced fertile hybrids; among them we may mention the following on the list of *Anatidæ* :—

Chinese Goose (*Anser cygnoides*)	crossed with	Common Goose (*Anser domestica*)
Pintail Duck (*Dafila acuta*)	,,	Common Duck (*Anas boschas*)
Tufted Duck (*Fuligula cristata*)	,,	Niroca Pochard (*Fuligula niroca*)

Among the *Gallinæ* the following have produced fertile hybrids :—

Sonnerat's Jungle Fowl (*Gallus Soneratii*)	crossed with	Bankiva Jungle Fowl (*Gallus bankiva*)
Ocellated Turkey (*Meleagris ocellata*)	,,	Common Turkey (*Meleagris mexicana*)
Common Pheasant (*Phasianus colchicus*)	,,	Ring-necked Pheasant (*Phasianus torquata*)
,, ,,	,,	Japanese Pheasant (*P. versicolor*)
,, ,,	,,	Reeves' Pheasant (*P. Reevesii*)
,, ,,	,,	Gold Pheasant (*Thaumalea picta*)

Silver Pheasant (*Euplocamus nycthemerus*)	crossed with	Linneated (*Euplocamus lineatus*)
,, ,,	,,	Purple Kaleege (*E. Horsfieldii*)
,, ,,	,,	White-crested (*E. albocristatus*)
,, ,,	,,	Black-backed (*E. melanotus*)
Linneated (*E. lineatus*)	,,	White-crested (*E. albocristatus*)
,, ,,	,,	Black-backed (*E. melanotus*)
,, ,,	,,	Purple (*E. Horsfieldii*)
Black-backed	,,	White-crested (*E. albocristatus*)
,, ,,	,,	Purple (*E. Horsfieldii*)

The remaining list comprises those hybrids that have hitherto been found barren or sterile :—

Common Fowl (*Gallus domesticus*)	crossed with	Common Pheasant (*Phasianus colchicus*)
,, ,,	,,	Guinea Fowl (*Numida meleagris*)
,, ,,	,,	Purple Kaleege (*Euplocamus Horsfieldii*)
Guinea Fowl (*Numida meleagris*)	,,	Pea Fowl (*Pavo cristatus*)
Gold Pheasant (*Thaumalea picta*)	,,	Silver Pheasant (*Euplocamus nycthemerus*)
Silver Pheasant (*Euplocamus nycthemerus*)	,,	Common Pheasant (*Phasianus colchicus*)
Reeves' Pheasant (*Phasianus Reevesii*)	,,	Cheer Pheasant (*P. Wallichii*)
Black Grouse (*Tetrao tetrix*)	,,	Common Pheasant (*P. colchicus*)
Red Grouse (*T. scoticus*)	,,	Common Pheasant (*P. colchicus*)
Wood Grouse (*T. urogallus*)	,,	Black Grouse (*Tetrao tetrix*)

Among mammals hybrids are comparatively rare, the mule, produced between the horse and ass, being the most common, and although large numbers of those hybrids are bred and kept, instances of their reproducing are extremely rare. Among ruminants a few instances are to be found. The two species of camel (*Camelus dromedarius* and *C. bactrianus*) will breed together; the llama (*Auchenia glama*) will breed with the alpaca (*A. pacos*), and the offspring are fertile. Several species of deer, when crossed, produce fertile hybrids: for instance, the Barbary deer (*Cervus barbarus*) with the red deer (*C. elaphus*), the Mexican (*C. mexicanus*) with the Virginian deer (*C. virginianus*). Several others are also recorded upon good authority.

Several instances of hybrids among the carnivora are well authenticated. The lion (*Felis leo*) has bred with the tiger (*F. tigris*), the leopard (*F. leopardus*) with the jaguar (*F. onca*), the wild cat (*F. catus*) with the domestic cat (*F. domestica*).

Dogs, wolves, and jackals when crossed produce fertile offspring; but a cross between a dog and true fox is a thing at present only stated upon very unsatisfactory evidence; proof is wanting that such a cross has ever taken place. The same want of proof exists respecting the so-called leporines, said to be a cross between the hare and rabbit. Let it be borne in mind the wonderful difference that exists between these two species at the time of birth: the young hares are born in a very fully and perfectly developed condition, well clothed, the eyes open, and a few hours after birth they run about and feed themselves. What is the condition of the young rabbits? They are *naked* and *blind*, remain in the nest at least a fortnight or three weeks. All the so-called leporines are rabbits, not only in this, but in every other character.

HIBERNATION.

THIS remarkable habit of adaptation possessed by some animals has been from time immemorial a kind of mystery, and notwithstanding all that has been written upon this subject, there still appears but little really known or understood about it. In a very elaborate treatise published in the *Cyclopædia of Anatomy and Physiology*, by Dr. Marshall Hall, many facts well known to the practical naturalist are altogether omitted, and statements made that are certainly unsupported by careful, well-conducted experiments.

It is, for instance, stated at page 765, "The direct effect of cold on the animal frame is, as I shall shortly have occasion to state particularly, totally different from hibernation. Hibernation is a physiological condition; the direct effect of cold or torpor is, on the contrary, a pathological and generally a fatal one."

Now the above does not appear to be a correct view of the subject, for it cannot be denied that the temperature alone has more influence upon hibernating animals than any other cause, unless we refer to the mud fish of Africa (*Lepidosiren*), that hibernate all the dry season; but this is a totally different state of hibernation, to which we shall again refer. Again at page 767, "To walk over the floor, to touch the table, is sufficient, in many instances, to reproduce respiration and to frustrate the experiment."

It is quite evident from the above that the animals

were simply asleep in the ordinary sense of that condition, and not in a state of hibernation at all, for all the noise and rattling is insufficient to rouse it from its lethargy.

An instance occurred to some pet marmots which our servant found one cold morning fast asleep, and believing them dead, consigned them to the dust-hole. They were, however, rescued before they were quite buried in the ashes that follow in the usual course of funerals.

Many animals sleep soundly, and may be regarded as dormant, but not torpid; but animals in a perfect state of hibernation are not only dormant, but torpid, a state in which the animal's temperature is much lowered; the respiration and circulation, together with the digestive functions, nearly cease, and the organs of secretion and excretion are inactive. In this condition but little air is required. This is clearly shown by the experiments published by Dr. Marshall Hall, p. 776: "The respiration continues low, the temperature falls, and the animal can bear, for a short period, the abstraction of atmospheric air."

This calls strongly to mind the fact that the rough labouring population, who are possessed of enormous strength, which enables them to continue the most laborious work in mines and dismal places, sleep, when nature requires rest, the apparent sleep of death, in the most foul and stifling atmosphere, and wake up with the strength of refreshed giants. Whatever may be said or thought upon the necessity of well-ventilated and airy sleeping rooms, the fact of a large mass of our species living and doing well in a totally different state remains yet to be explained. Many generations of these powerful and robust men have existed without any apparent diminution in strength or courage, like bears and lions sleeping in caves and loathsome places. Contrast their

state with that of the highly favoured of our race, whose sleeping apartments possess every comfort, have all the requirements necessary to a sanitary condition that an enlightened nation can imagine, and yet he sleeps not, or if he do, it is so imperfectly that all the hours required to rest an exhausted frame are either wakeful or dreaming.

It would be esteemed by many of our species as a great boon could they sleep quietly through the cold and gloomy season of the year without having to encounter a few difficulties which would inevitably present themselves to their so doing. As a preparatory measure they would have to undergo the process during the summer and autumn months of laying up a store of fat, to which those who have no desire to become obese would object. Again, they would have to be prepared to settle all accounts previous to retiring to their winter quarters; and much difficulty would be experienced in keeping out of the reach of those who appear "wide awake under every circumstance." Consequently many endless disadvantages would be attendant upon a torpid state of being, had such been allotted to our kind.

But to creatures that could not exist in an active state during the cold season, it is of immense importance that they are endowed with the habit of fasting and sleeping during that time. The different animals that are able to live, for lengthened periods, without food, are worthy of remark. Among mammalia we have bats, hedgehogs, bears, marmots, squirrels, dormice, and many others, which possess that power, although varying much in the time, the duration of which depends upon the temperature. No kind of bird, however, hibernates, or can live in a torpid state.

Some species wake up occasionally on warm sunny days in hard winter and take a meal, and again retire to "sleep

the happy hours away." Squirrels and dormice frequently do so, as also some of the species of bats; the warmth of the day causing a few insects to put in an appearance, upon which the bats feed for an hour or two, and again quietly hide up before the temperature lowers sufficiently to produce numbness. These, like the dormice and other rodents, when in a torpid state, are, to the touch, if taken into the hand, perfectly cold, and are quite motionless, and to all appearance dead; but upon the temperature being raised, they become in a short time lively and active. Were it necessary to enlarge by additional facts to show that in a large number of cases temperature is sufficient to account for the lethargy, a better case cannot be selected than the common dormouse; nothing more is required to rouse this little pet from his slumber than to increase the warmth of the apartment; the animal will without injury wake up and feed as often during the winter as is thought proper; endless experiments have been successfully tried to prove this. Let it, however, be borne in mind that these animals to be experimented upon must be perfectly healthy, and in the excessively fat state natural to them before the winter sets in, otherwise they will not live during the cold weather. Another important matter is not to change the temperature too rapidly, for few animals can live or continue in good health if the temperature is suddenly and frequently changed by many degrees. There can be no question that the animals that hibernate are always excessively fat previous to retiring to sleep, for if otherwise, they would die from the effects of the cold and exhaustion; it is equally certain that during the period of hibernation this store of fat is being consumed by absorption, for at the termination of the winter those animals that have slept all the cold season wake up quite thin and hungry.

It is a curious fact that bears never hibernate in captivity, at least no instance has been on record to the knowledge of the writer, although in Europe the brown bear is known to do so in a state of nature.

SUPPOSED HIBERNATION OF BIRDS.

Many cases can be brought forward to prove that migratory birds are frequently found in a torpid state during the winter, and which upon being placed in a warm room soon revive, and possibly with care and proper food may be recovered; but I fail to find any instance of any kind of bird surviving under any circumstances without food for two or three weeks or as many months. Unless the animal is able to support life for many weeks in a state of hibernation it would be a failure to sleep or become torpid for a day or two only. Any animal that becomes torpid without the power of hibernating must necessarily die if allowed to remain in that state. The object of hibernation is to pass away time, and preserve the animal's life during the season when its food cannot be obtained. Now if birds of any kind were able to do this, we should have no difficulty in finding abundance of proof of their capability of doing so. That a few unfortunate migratory birds are every year left to perish by the cold and want of food is well known, and the fact of landrails being more frequently found than most other birds is easily explained. No doubt many pass the winter in Great Britain in sheltered situations (the late Mr. Yarrell, in his *British Birds*, gives instances of landrails being killed throughout the winter months), where they find a sufficiency of food to support life; a very scanty supply would answer, for, be it observed, the landrail becomes excessively fat in the autumn, and, like the animals that hibernate, this store of

fat is absorbed and aids in keeping up the strength of the bird during the cold and starving period. Numerous instances of migratory birds remaining in Great Britain are met with, and many are easily accounted for,—wounded wings or injured feathers are quite sufficient to detain them; and the dying down and withering of the vegetation, thereby affording little shelter, render landrails more likely to be discovered, although they creep into almost any place for concealment. That some birds can exist for six or seven days without food or water is a fact of which the writer can furnish undoubted proof; but a really hibernating bird has at present an existence only in the imagination, and would be as difficult to find as Queen Anne's ghost.

When once a belief is well and widely established, it appears to me to be quite useless, however frequently it may be contradicted and the truth of the story denied, to try to make converts to a contrary opinion. It is like weeds in a garden, which crop up again and again only to be destroyed for a time. To get entirely rid of them seems impossible. A case in point is the old story of the hibernation of the swallow, which lingers still in many parts of this country. Only as late as April 2, 1881, there appeared in *Land and Water* a letter upon this subject. I wrote the following in reply:—

THE SUPPOSED HIBERNATION OF SWALLOWS.

It appears to me to be most extraordinary that any persons having only a trifling knowledge of birds and their habits should at the present day entertain for one moment the slightest doubt upon this subject, and that they, in order to give a little strength to this doubt, should refer to the ancient but long-exploded statements

of those who have left this sublunary sphere a hundred years or more.

Now, considering how numerous is the swallow tribe in Europe—every summer countless thousands swarm in all suitable localities, and breed in almost every city, town, and village—were it the habit or nature of these birds to retire into caves, hollow trees, holes in walls, the roofs of buildings, or to sink into ponds, brooks, or rivers, surely some of them would be found in the dormant state during the winter months. Such a state of things never occurs, and if this supposed hibernation took place, specimens would be forthcoming not only casually, as it has been stated, but constantly, for the very reason that the study of Natural History of late years has made such rapid strides, that thousands of people of an inquiring mind are upon the look-out for anything new and interesting, and the sight of a living swallow in a torpid state would be regarded by these persons as one of the "wonders of the world," and attention would be at once called to such an unexpected circumstance. The fact that swallows are found in large numbers during their visits to this country, and constantly near human habitations, feeding upon the flies and other ephemera most abundant in the locality, would naturally lead us to expect they would hibernate (if such was a fact) not far away from the places that supplied them with food, and, if such was the case, there would be no difficulty in their being discovered.

Now, putting all other considerations aside in order to test the matter fairly, and show that I am inclined to give those who believe in the theory of torpid swallows a chance of proving their case, I am willing to pay the sum of ten pounds for every hibernating or torpid swallow brought to me alive, during the months of December, January, and February. I must, however, guard myself

against the production of swallows that have been kept in captivity, knowing well (having myself kept them all the year in a cage) that this can be done; but what I must insist upon is, that any swallow brought to me in the months before named must be alive and well authenticated as to the place and conditions in which it was found.

I have not, as a result of this offer, had to pay for a single specimen, otherwise I certainly should have been ruined had there existed any truth in the statement made by the people who believe they know all about the subject.

A reference to the dictionary explains the word "hibernate," to winter: to pass the season of winter in close quarters or in seclusion. The words hibernate and hibernation would appear to be used in this correspondence in a wrong sense.

Professor Newton, writing on the subject, says:—"The alleged torpidity of swallows or other birds is quite a different thing, and I have never met (nor do I expect to meet) with evidence of it that I can accept."

MIGRATION.

No act of nature affords so wide a field for speculation as that of the migration of animals. The causes that influence their movements, the power that directs them, the object and importance of the natural laws that govern and impel them to depart from a particular spot and to return to it, at some future time, by the most miraculous and unerring certainty, probably after the lapse of a year or more, are mysteries that require profound consideration before we can attempt to describe, or even to suggest, by what impulse they are guided.

The inclination to travel from place to place is strongly implanted in by far the largest portion of the animal creation, and it may be fairly considered that the migratory far outnumber the non-migratory species. There are two Orders among vertebrate animals the power of locomotion of which best adapts them for migration—viz. the Orders *Aves* and *Pisces;* and in those Orders we find many species that annually migrate, some that occasionally, some that rarely, and others that never do so. The desire to migrate has been attributed by some to an actual necessity, such as scarcity of food; but that does not fairly account for it, as many of our summer birds leave this country at the time that food is most abundant. We might, with equal right, argue that the animals that hibernate do so on account of the supply of food failing; but we have already shown, in a previous paper, that such

is not the case, as many of the animals that retire to sleep, store up beforehand a large quantity of food, in case of waking up during the winter.

The temperature has a most important influence over the sensitive organs of an animal, which are further stimulated by electric changes in the atmosphere, and the more careful the attention bestowed upon the subject, the more must ultimately be revealed to us many of the causes of the movements observed in the highly-organized and sensitive aërial being known to us as a bird; the changes in the state of the atmosphere, its moisture or dryness, its electric or non-electric condition, are all indicated by the actions of that wonderful creature, which warn us of the coming storm, as surely as they indicate the return of spring or the approach of winter.

Bearing in mind that no other animal, however delicately or highly organized, can feel these changes, or give evidences of them, so completely as a bird, which by its power of flight can rise from the hot or cold earth and fly, at will, to a warm or cold, dry or moist climate, to suit its pleasure or necessity; we may venture to say that the great laws of animal distribution are carried on by the changed condition of climate and of food, and consequent suitability. That migration was ordained by an all-wise Providence at, and has continued from, the creation, a necessity, not only to all animals but to man, is beyond a doubt.

The arrival in spring at the Northern or Arctic regions of migratory birds for the purpose of breeding, instils new life and carries fresh food to the men and animals that have survived through the gloomy winter. Thus, like resuscitation in a single individual, the exciting causes for renewed activity are developed.

Having supplied the wants of the inhabitants of their

native country, and increased and multiplied their own species, they leave with their progeny for a less severe climate, arriving in good time on our own shore to afford food just as the most severe part of the winter renders their appearance most welcome, thus balancing their favours by periodical visits to the hungry poor of both regions. Not only are the starving people of the cold regions supplied with food by migratory birds, but also were the famished Israelites suppled with food in the wilderness by the same means, as our much-loved British naturalist, the late Mr. Yarrell, in vol. ii., p. 358, quotes from the Psalms:—

"He caused an east wind to blow in the heaven: and by His power He brought in the south wind. He rained flesh also upon them as dust, and feathered fowls . . . in the midst of their camp, round about their habitations. So they did eat, and were well filled: for He gave them their own desire."

Mr. Yarrell, after a careful investigation of this passage, remarks at p. 360, vol. ii.:—

"With these facts before us, considering the positive testimony of the Psalmist, that the unexpected supply of food to the Israelites was a bird, and that bird, agreeably to the Septuagint and Josephus, a quail, that only one species of quail migrates in prodigious numbers, that species, the subject of the present notice, we are authorized to pronounce the *Coturnix dactylisonans* to be the identical species with which the Israelites were fed. We have here proof of the perpetuation of an instinct through 3300 years not pervading a whole species, but that part of a species existing within certain geographical limits; an instinct characterized by a peculiarity, which modern observers have also noticed, of making their migratory flights by night."

Innumerable lives are lost during the migratory move-

ments, and on arriving at the desired spot large numbers are slaughtered by the anxiously awaiting inhabitants, who receive them with a fiery warmth. Such is the unfortunate fate of many of our own species who migrate to strange lands, and instead of becoming settlers are cruelly settled by the rude natives, who, rightly or strongly, object to the intrusion of enterprising strangers.

Migratory animals frequently are compelled by the nature of their food to shift their quarters as the food upon which they exist may be moving, such as fishes or insects, consequently birds or other animals are obliged to follow in the rear or wake of their lively-anticipated meal; but in the case of animals that feed on vegetable substances, such as fruit, seeds, berries, etc., that are only to be found at certain seasons, they must also shift from place to place and follow the season that produces their food, reminding one of the story of a man whose penchant for green peas caused him to visit Smyrna, he having heard that at that place they could be obtained in great perfection long before they made their appearance in more northern localities. Having enjoyed his feast until he found them getting rather harder and older than he liked them, he followed the growing crops northward until he reached the extreme limits of Scotland, where he ended the pea season about the time to take his departure again for Smyrna to again enjoy this delicious vegetable.

This may be regarded as an apt illustration of one kind of migration, for had our species been born pea-eaters we should no doubt migrate accordingly.

Many species of birds follow the successive growing crops of wild plants in order to feed upon the fruit or seed; consequently their extension is dependent upon the distribution of the plants, upon the fruit or seed of which they

exist: as an illustration we may point to such plants as the thistle, the seed of which is provided with a most beautiful and perfect floating apparatus, which causes it to be wafted by the slightest current of air for miles across the country, aye, even to be borne by the wind beyond the sea, which, rapidly becoming disseminated over the earth, are the means of attracting and of inducing to migrate the creatures that live upon their seed.

A singular confirmation of this may be found in the partially changed habits of the common goldfinch. Since the formation in this country of railways the thistles have increased on the uncultivated banks or sides of the various cuttings on the different lines, and goldfinches, as they feed greatly upon thistle seed, have congregated in the localities where that weed abounds, and have become comparatively rare in places where formerly they were numerous.

The introduction and cultivation of a particular kind of grain or fruit into a country will tend to attract some of the wild animals from the surrounding forest to the cultivated ground, and to increase their numbers by the food so readily obtained. An instance of this kind is causing the cultivators of the grape in Australia much trouble, as since the introduction of the vine to that country, the large fruit-eating bats (*Pteropus poliocephalus*) have committed much damage. Collecting in large numbers after dark, they devour the grapes in prodigious quantities, and as their numbers appear on the increase, it is doubtful whether the cultivation of the grape can be continued with any prospect of success in Australia. It is said that the authorities in Australia were at one time in great fear of the escape of lions, tigers, or other large carnivora from travelling collections, for should these formidable creatures only obtain a footing, the abundance

of sheep and other food, together with a suitable climate, would assist in their rapid increase, and once established, the mischief would be beyond the power of the inhabitants to stop or control.

Great opportunities are afforded to migratory birds to cross the sea. They are enabled to rest on at times large floating masses, such as that commonly known as the Gulf weed, which, according to some authors, is equal in size to the area of Great Britain, and which not only affords them a resting-place, but in many instances supplies them with food, for these masses swarm with living animals of endless kinds, insects, crustaceans, mollusca, etc.

Many years since a dead whale floated on the coast of Devonshire; it was almost white, being thickly covered with the grey phalaropes; many hundreds of these beautiful and rare British birds congregated upon the floating carcass, and no doubt fed upon parasites and other creatures that infested it, and on portions of fat. These birds were quite tame, and the boys about Devonport and Plymouth killed great numbers of them with sticks; had these birds not met with such wanton destroyers they might, in all probability, have established themselves on our shores, as one or two instances are recorded of their being found in this country in the breeding season, although their great breeding-ground is, according to Mr. Yarrell, in the Arctic regions. Porpoises of various species, sea-gulls and other fish-eating birds, and fish-devouring fishes, follow to our shores the shoals of smaller fry upon which they feed, just as the lions and other carnivora follow, across the land, the herds of antelopes, and thus distribute and spread their kind.

In the second volume of Sir Charles Lyell's *Principles of Geology* is a chapter upon migration of plants and

animals, abounding with the most interesting facts bearing upon this subject, from which we beg to make the following quotation. At p. 357 we read:—

"In very severe winters great numbers of the black bears of America migrate from Canada into the United States, but in milder seasons, when they have been well fed, they remain and hibernate in the North."

And at p. 363 it is stated:—

"The late Admiral W. H. Smyth informed me that, when cruising in the *Cornwallis* amidst the Philippine Islands, he saw more than once, after those dreadful hurricanes called typhoons, floating masses of wood, with trees growing upon them. The ships have sometimes been in imminent peril, as these islands were often mistaken for *terra firma*, when, in fact, they were in rapid motion.

"It is highly interesting to trace, in imagination, the effects of the passage of these rafts from the mouth of a large river to some archipelago, raised from the deep by the operations of the volcano and the earthquake. If a storm arise, and the first vessel be wrecked, still many a bird and insect may succeed in gaining by flight some island of the newly-formed group, while the seeds and berries of herbs and shrubs which fall into the waves may be thrown upon the strand. But if the surface of the deep be calm, and the rafts are carried along by a current, or wafted by some slight breath of air fanning the foliage of the green trees, it may arrive, after a passage of several weeks, at the bay of an island, into which its plants and animals may be poured out as from an ark, and thus a colony of several hundred new species may at once be naturalized.

"Although the transportation of such rafts may be of extremely rare and accidental occurrence, and may happen only once in thousands or tens of thousands of years, they may yet account in tropical countries for the extension of some species of mammalia, birds, insects, landshells, and plants to lands which without such aid they could never have reached.

"Some birds in the Order *Passeres* devour the seeds of plants in great quantities, which they eject again in very distant places, without destroying its faculty of vegetation: thus a flight of larks will fill the cleanest field with a great quantity of various kinds of plants, as the Melilot trefoil (*Medicago lupulina*), and others whose seeds are so heavy that the wind is not able to scatter them to any distance. In like manner, the blackbird and missel-thrush, when they devour berries in too great quantities, are known to consign them to the earth undigested in their excrement.

"The sudden death to which great numbers of frugivorous birds are annually exposed must not be omitted as auxiliary to the transportation of seed to new habitations. When the sea retires from the shore, and leaves fruit and seeds on the beach or in the mud of estuaries, it might by the returning tide wash them away again or destroy them by long immersion; but when they are gathered by land birds which frequent the sea-side, or by waders and

water-fowl, they are often borne inland, and if the bird to whose crop they have been consigned is killed, they may be left to grow up from the sea.

"A deer has strayed from the herd, when browsing in some rich pasture, when he is suddenly alarmed by the approach of his foe. He instantly takes to flight, dashing through many a thicket, and swimming across many a river and lake. The seeds of the herbs and shrubs which have adhered to his smoking flanks and even many a thorny spray, which has been torn off and has fixed itself in his hairy coat, are brushed off again in other thickets and copses. Even on the spot where the victim is devoured many of the seeds which he had swallowed immediately before the chase may be left on the ground uninjured and ready to spring up in a new soil."

Any one accustomed to keeping, in cages or aviaries, birds that are migratory, knows full well the season in which the habit of migration takes place; the birds that are perfectly tame and reconciled to captivity, all at once become uneasy and restless, fly about the cage, jumping and dashing here and there the whole night through, calling aloud, and almost ceasing to take food, and for several days and nights this determination to depart will sometimes last. Strange to say the same thing again occurs at the season to return to this country; but in this case the restlessness is much less severe and is soon over. Year after year this same desire to migrate is manifested by the same birds.

INCUBATION.

On the first thoughts upon this subject it may appear of little importance to the general observer how long it may require to hatch an egg, and under what conditions it can be hatched, but after a little consideration many circumstances will become known that cannot fail to impress upon us the powerful and undeviating law that exists in all created life, the fixed period for change from one state of existence to another, not only observable in the advancement of the embryo in the egg, but continuing through the whole life of every individual of every species. As the most ready and easily-explained examples, let us take the eggs of birds: we find an unalterable and measured time required for hatching the eggs of one class or order of birds, and in this way we find that the eggs of some kinds of birds will hatch at a much earlier period than others; as, for instance, the pigeon's eggs hatch at the end of fourteen days, the common fowl at twenty-one days, the duck at twenty-eight days, the geese at thirty-five. It will be seen by this the remarkable regularity of the period of the multiplying of the universal seventh day. The longest period required for hatching the eggs of birds occurs with the struthious birds (ostriches), and the period is seven times seven, or seven weeks. It will be thus seen that the earliest time recorded will be twice seven and the longest time known seven times seven. This certainty of time, as before

stated, does not depend upon external circumstances, nor can it be influenced by them without damage or loss of life; for instance, no increase of heat beyond that employed or generated by the parent birds will hasten or quicken the production of the young bird, while, on the other hand, a lower temperature is likely to prove fatal instead of retarding its development.

The consideration of these immutable laws, and the constancy of their appearance before us in such various shapes and forms, prove beyond all doubt the existence of phenomena of which we have at present but a faint glimpse. Do we not see the same regularity of a fixed time, and that the same number of days between the changes that occur in the maladies to which we and other animals are subject—are not the marked and noticeable changes every seven days? That this number, recurring as it has and must have done in all time, doubtless led our species to recognize the seventh day, and our laws, terms of apprenticeship and imprisonment, leases of houses and land, and endless other matters, probably came into use from the observable regularity of this fixed and unalterable law set before us.

It is not only in the incubation of the eggs of birds that this recurrence of the seventh as a period of change is constant, but in the instance of birds' eggs it is so easily watched and recorded, for the development of most diseases is marked by the same time; whether it be small-pox, ague, or any other fever, the same law appears to influence the state of the sufferer, and mark the changes that take place regularly, for better or worse.

Even in the ordinary course of the natural production from the egg, we may be pardoned in remarking that much misapprehension exists. It is by many believed that the parent birds assist the young in breaking out of the egg.

This is altogether a fallacy. In no instance does anything of the kind occur. The young bird chips or breaks through unaided (except by the warmth imparted) by the parents. The marked difference in the period required in hatching the various kinds of birds is also marked by the different state or condition of the young at the time they are hatched. For instance, the pigeon that is hatched in fourteen days is naked and blind, and has to be fed by the parents, and remains in the nest until it has grown its feathers and is enabled to fly. The chicken, however, that required twenty-one days to hatch, comes out prepared to run about, well clothed in down, its eyes well open, and it commences to pick up its food from the ground, and is in every way perfectly able to shift for itself without the aid of its parents, if provided with food and shelter.

The early hatching of the pigeons and other birds that remain long in the nest, and require to be fed and attended by the parent birds, contrasts strongly with others that are produced in a far more perfect state. This perfect and imperfect state of development is not confined, however, to any particular class or order of the vertebrate animals, for in the mammalia we have the same state of early birth in the Marsupial animals,—such as the kangaroo and opossums, who are provided with pouches to receive imperfectly-developed young; while in the Ruminants—such as deer and antelopes, etc.—the young are able to run and follow their parents soon after birth. It is not a little remarkable, however, the diversity that exists in this matter among the Rodents; for instance, the hare and rabbit. In the former the young are well clothed, see, and feed soon after birth, while the rabbit is born naked and blind, and remains in the nest for weeks. Many other instances could be adduced of this singular diversity in the large Order known as *Rodentia*.

WHAT IS AN AMPHIBIOUS ANIMAL?

In the old books of Natural History the amphibious animals held an important and conspicuous position, and, notwithstanding the advancement of science, a vast multitude of people still entertain the same ideas and notions of amphibious animals that have been banished from most Natural Histories for at least a hundred years.

It is not therefore surprising to hear the remark issue from the crowd of persons upon seeing the hippopotamus in the water, that it is amphibious. The same remark is still applied to the seal, the otter, the beaver, the crocodile, and many other animals. To tell these people that these creatures are only aquatic, or semi-aquatic, and are not now regarded as formerly, and that amphibious animals are now restricted to the batrachians, or, in other words, to the frogs, toads, and animals who in the early stages of their existence breathe by means of gills, and that the term amphibious, as formerly applied, has become obsolete, may, to those who have attended in the most trifling manner to the advance of Natural History, appear quite uncalled-for and unnecessary, for it is indeed astonishing to find how slowly these matters advance, as though information of this kind was resisted, reminding one of the story of the old woman whose income was much increased by showing visitors over an ancient castle, and who carefully pointed out a stain on the floor where, in ages long ago, some dreadful deed of blood had been committed, telling them that

all the washing and scrubbing had failed to remove this dreadful mark, and who, upon one occasion, was addressed by a visitor, probably an enterprising inventor or proprietor of a celebrated washing-powder, who offered to remove the stain on the floor in less than five minutes by the application of only one penny packet of his wonderful washing-powder. The old lady looked at him aghast, and, with a vehement gesture, exclaimed, "No, sir, it has been there all these years, and I would not have it touched or rubbed out by you or your washing-powder for all the world."

So it is with many old notions and ideas most difficult to banish. They last and linger on for generations, to the surprise and astonishment of those who know better. To be called upon to tell people that the old method of considering all animals amphibious that passed as much of their time in the water as on the land, is looked upon as absurd, for they include those creatures having no affinity or relationship whatever—such as the hippopotamus, seals, otters, beavers, crocodiles, turtles, penguins, and others, who are only aquatic or semi-aquatic. To call these and others amphibious is as confusing and difficult as to determine what is or is not an aquatic animal.

I myself once suffered the misfortune of this want of knowledge of discrimination on the part of the owner of (what he believed and called) a very rare and wonderful amphibious animal, and whose description baffled the ingenuity of all who heard it to determine what it might be. The incident caused no little amusement as well as disappointment to one always ready to investigate and determine for himself. To undertake a rather long journey, and undergo the mortification of beholding a common spotted cavy or paca (*Cœlogenys paca*) standing in a puddle of water in the small garden at the back of its owner's house, instead of a wonderful amphibian. To be

angry was out of the question, as the owner insisted upon it that it was amphibious, and in proof of his assertion pointed out that it was up to its middle in water, and that it passed as much of its time in as out of water. With these facts, it was useless to offer any further argument or opposition; the owner certainly had the best of it. But the result always acted as a caution not too readily to rush off to see a new and unknown amphibious animal.

How often do we find creatures that have never been suspected of frequenting water quite at home in that element. Looking at the great South American ant-eater (*Myrmecophaga jubata*), a more unlikely beast never was seen; yet into the river he goes, and washes, and swims, and plays about for hours. Who would expect any of the family of bats to be addicted to aquatic life? Yet some species of this family have been met with, both in Africa and America, that are semi-aquatic. In the former country they feed on shrimps, and in the latter upon fish, which they catch in their sharp-hooked claws.

How few animals are as helpless as man, when for the first time immersed in water! Most wild animals swim, and that without teaching or learning of any kind. Man raises his arms in despair, sinks to the bottom helpless, overpowered and rendered incapable of offering that kind of resistance exhibited under the same circumstances by most of the lower animals.

BOVINE ANIMALS.

THE FIRST APPEARANCE OF THE GAYAL (*BOS FRONTALIS*) IN EUROPE.

UNQUESTIONABLY the first of this species that had ever been brought into Europe was forwarded to me by Mr. Edward Blyth, in the year 1844, by the ship *Lord Hungerford*. On the arrival of the vessel at Blackwall, in 1844, I was called upon to pay £40 freight. I provided myself with two or three assistants, and determined with their help to walk the animal to the Zoological Gardens. I had ropes attached to its head in order to check it if it attempted to run away, and under these arrangements we started on our expedition, having with me a canvas bag filled with salt, which was moistened on the outside, and which this animal showed a great fondness in licking. With this enticement the animal followed me on shore, and we proceeded on our journey. As usual a London crowd soon collected, and with the natural accompaniment of noise and rough horse-play, surrounded our small party, to the great annoyance of myself and the subject in charge.

The animal having been on board ship so long without exercise, caused the journey to be most tedious and distressing. We had not proceeded much more than half-way to the Gardens, when the poor beast was so fatigued, that it more than once attempted to lie down on the road.

One of my assistants then procured a whip, and it was

by the application of this instrument that we succeeded in driving the animal to its destination safe and sound.

In due course I was anxious to dispose of it to the Zoological Society, who declined to purchase the animal. I then offered it to the former Lord Derby, who also refused it.

I then offered it to the Society if they would simply pay the freight, which amounted to £40. This also was refused. The animal lived in the Zoological Gardens from 1844 to 1846; after its death I proposed to the authorities of the British Museum that they should purchase the skin and skeleton, but this proposal was declined.

I prepared the skin and skeleton, and corresponded with Mr. Blyth, the then curator of the Calcutta Museum, who begged me to forward to Calcutta the skin and skeleton for the Museum, as they had no specimen.

This I accordingly did, and I believe that both are to be seen in the Calcutta Museum at the present day.

HORNED ANIMALS.

It may be nearer the mark to say horned mammals, because there are many animals called horned that I have no intention to include in this notice beyond saying there are birds called horned tragopans, horned screamers, and among reptiles, horned vipers, horned frogs, etc. My intention is to confine these observations principally to the class of ruminants comprising the bovine and cervine families. It has often struck me when reading the statements of very intelligent and trustworthy explorers and travellers, what a lamentable want of knowledge of Natural History is so often displayed; for instance, a traveller in the interior of Africa describes seeing a large herd of deer, the unfortunate writer not being aware that no deer exist in the interior or the South or West of Africa, and to see them is an utter impossibility, the fact being that only one species of deer exists, and that in North Africa only. This one kind has a very limited range, is, in truth, only a local variety of the European red deer, but it has received a specific name, Barbary deer (*Cervus Barbarus*), having been obtained from that locality.

The truth is, that all these so-called deer met with throughout Africa are antelopes, and belong to very distinct genera, and I will endeavour shortly to point out the most ready means of distinguishing between these genera. All antelopes (and the species are very numerous)

belong to the bovine or ox group, to which also the goats and sheep claim a near relationship; on the other hand, the true deer all belong to the *Cervidæ*.

Now, these two families are most easily distinguished one from the other, by the simple character of their horns. In the *Bovidæ* the horns are never shed, and the true horn is supported by a bony core that fills up the hollow interior of the lower part of the horns.

In the deer family, *Cervidæ*, on the contrary, the horns are solid and most frequently branched or bearing numerous points or antlers. Moreover, these horns are cast off annually, and renewed in a most extraordinarily short time.

The mode of reproduction of deer, or rather stags' horns has been so frequently and fully described, that it appears to me unnecessary to dwell upon this subject, more than to say the blood-vessels that supply this rapid growth are on the outside of the bony horn and covered over with a thick tough skin, externally coated with a velvet-like fur, which peels off as soon as the new horn is sufficiently hard to bear the rubbing against the trees or branches of trees, indulged in by these animals at the season in which the renewal of their horns takes place.

There is one very remarkable animal, differing from all the other ruminants, viz. the American prong-horned antelope (*Antilocapra Americana*). This singular animal does not fit comfortably into any classification, but stands at present alone and unique, being the only known hollow-horned ruminant that sheds its horns. Many years since the North-American Indian hunters tried in vain to persuade those eminent naturalists, Messrs. Audubon and Backman, that this animal shed its horns. In their second vol. of *The Quadrupeds of North America*, p. 198, will be found the following words:—

"It was supposed by the hunters at Fort Union that the prong-horned antelope dropped its horns, but as no person had ever shot or killed one without these ornamental and useful appendages, we managed to prove the contrary to the men at the Fort by knocking off the bony part of the horn and showing the hard spony membrane beneath, well attached to the skull, and perfectly immovable."

It therefore continued to be unknown or disbelieved until Nov. 7, 1865. On the morning of that day I witnessed the shedding of the horns of this very singular animal, and at a meeting of the Zoological Society, Nov. 28, 1865, I read a paper that was published in the *Proceedings* of the Society, calling attention to the fact.

Three months afterwards a letter, stated to have been written seven or eight years ago by Dr. Canfield (but which had been laid aside and unnoticed), was forwarded to the Society and published in the *Proceedings*, 1866. In this letter it was made to appear, and most thoroughly established the fact, that the prong-horn shed its horns annually; yet, notwithstanding, some American writers doubt the accuracy of the conclusion at which the best authorities have arrived. During the last autumn the prong-horned antelope now living in the Society's Gardens shed and renewed his horns exactly in the same manner as stated and described in the paper alluded to, as read at the Zoological Society's meeting in 1865.

There remains yet another group of animals that deserve a passing notice, because they are horned mammals, but not belonging to the bovine or cervine classes, and they are not ruminants. The group alluded to are the rhinoceroses. They are horned, but the nature and structure of the horns differ so entirely from the horned animals before described that it appears necessary to give a few words of

explanation with reference to their structure. In the different species of rhinoceros the *horns* are attached, and grow with the skin of the animal; they *are not hollow*, nor are they supported by a bony core, as in the bovine group. They (the horns) are not of a bony substance, as in the cervine group, but are composed of a substance of agglutinated hair, resembling the structure of the hoofs. The horns of the rhinoceros grow during the animal's life, but by the constant wearing down they are kept in working order, and are, when the animal lives in a wild state, tolerably sharp-pointed.

THE PRONG BUCK, OR PRONG-HORNED ANTELOPE OF AMERICA.

Previously to my paper, which was published in the *Proceedings of the Zoological Society* November 28, 1865, nothing was known, positively, to the scientific naturalist of the true nature of the horns of this very remarkable beast.

I proved, incontestably, the peculiar and unique condition of the shedding and the reproduction of the horns of this singular animal.

It may appear strange and almost incredulous that, soon after my paper was read in America, the Smithsonian Institution, with its great reputation, should forward a letter to the Zoological Society with the extraordinary statement that they had had this letter in their possession for eight years, unnoticed and unpublished, detailing and describing all that I had stated without making the slightest allusion to what I had already settled.

If there were any truth (which is much doubted) in the statement that Dr. Canfield had made the same discovery

in 1858, and that his long and very interesting communication had nevertheless been neglected and put aside for nearly eight years, the officials of the Smithsonian Institution would appear to have treated Dr. Canfield with very scant courtesy; unless they disbelieved his statements, and that it was only after my paper was published that they thought it worth while to notice them.

THE HABITS OF WILD ANIMALS IN CAPTIVITY.

This subject may be considered inexhaustible, but I intend to confine these remarks principally to carnivora or flesh-eaters, and herbivora or vegetable feeders, because the greatest and most striking difference in the habits are to be found in the animals forming these two groups or orders.

Taking for granted that everything has been done as regards kind treatment and feeding, and that suitable accommodation has been provided, the result is almost universally the opposite of what might be expected.

Take, for instance, the young of any of the carnivora—lions, tigers, leopards, etc.—and pet them, they become tame and fond of those who feed and caress them, but if caught when adult it is extremely rare that they become tame enough to be caressed with safety.

On the other hand, take the vegetable-feeding class, such as stags, antelopes, oxen, sheep, or goats; obtain any of these from their birth and rear them by hand, and in all instances, with few exceptions, they become, when adult, the most savage and dangerous animals in existence. At the same time, if these animals can be caught when adult they are timid, and fly from man. The reason of this appears to me very plain. In the case of pet stags and other horned animals reared as pets, never having

had any fear of mankind in their infancy, they, on becoming adult and assuming their natural habit of using their horns during the rutting season, fail then to distinguish the hand that fed them, and, as war is in the nature of the creatures, they attack friends and foes unmercifully. Hence the danger of keeping horned pets.

My discovery of this was made after introducing to my children an unfortunate lamb a few days old. This motherless, harmless, pretty creature at once became a most beloved and darling pet. The most devoted affection was bestowed upon it, and everything was done for its welfare and comfort. It prospered and did well, and the pride of the whole family was to think what kindness and attention had accomplished for this poor, deserted, and neglected creature. But, as time went on, the harmless little lamb got larger and stronger, and began to exhibit signs of independence, gradually but, undoubtedly, feeling able to take his own part—for it was of the male persuasion, as Mark Twain says—and consequently had no fear and less gratitude, so that he occasionally made a rather unpleasant butt at the only and best friends he ever had, or was likely to have, and with very disagreeable results. His banishment soon followed. He was consigned to a large field, and he became a terror to passing travellers who incautiously crossed the field. With a hop, skip, and jump he was behind any one in an instant; with one good spring, the unfortunate traveller was on his hands and knees if not on his face. For this disagreeable and vicious habit the only cure that presented itself was the butcher, who ended the life of the pet lamb. This is my experience with nearly all tame-reared ruminants, whether oxen, stags, sheep, antelopes, or goats.

Doubtless, individual differences occur, but, as a rule, there can be no question that these tamely-reared rumin-

ants are far more to be feared than the timid wild ones. Another remarkable fact connected with these vegetable-feeding horned animals that have been bred in captivity (not petted and handled) and reared by the parent is that they are the wildest creatures in the world if anything is attempted to be done with them in the shape of catching, packing up, or moving them from one place to another.

This may appear strange, but it is perfectly true, as long experience has proved. The reason is this, the animal, from the day of its birth, has been with its mother and accustomed to see, daily, any number of persons, feeding from their hands and appearing perfectly tame, but the moment anything is attempted to be done with the creature that is new to it, it takes fright, and dashes off, rushing madly against hurdles, fences, or anything in its way, frequently ending by breaking its neck or legs. In this the animal exhibits all its natural wildness, because, although it appeared to be perfectly tame and tame bred, it had never been tamed or interfered with, whereas all imported animals that have been caught, caged, and undergone a sea voyage are so completely tamed that but little trouble is afterwards found in catching, packing, or moving them from place to place.

Most animals appear to live in fear of man, and much mischief is done by alarming them. Many accidents occur from animals being frightened. Elephants, horses, and other animals are naturally timid, and, when alarmed, do great mischief in their frantic attempts to get away from that which alarmed them. One of the most important things to be done is to prevent their being alarmed.

To those accustomed to pass much time among animals the influence of speaking to and kindly treating them is so well known that it is unnecessary to say anything upon this point, but to persons unacquainted with

the subject it may appear strange that the wildest and, apparently, the most savage creatures very soon understand, as it were, the intention of those who speak kindly to, and make friends with, them, quite independently of feeding them, and this, of course, is the most powerful inducement by which the good feeling of hungry animals can be obtained. Nevertheless almost all animals quickly understand and recognize the difference in the sound of the voice, whether in anger or an expression of kindness, and it is impossible, or nearly so, to gain the confidence of wild or tame animals without speaking to them. The influence that may be acquired over the most powerful and savage member of the brute creation by the voice, alone, is perfectly marvellous. The keepers of dogs, horses, or other domestic animals full well know the truth of these remarks, and the same thing may be observed as regards wild animals. Much more might be said upon this interesting subject.

THE PERFUMES OR ODOURS OF ANIMALS.

The human nose that travels about in the world, and notes the various kinds of smells, is probably aware that musk is found to predominate among animals. We find musk cats, musk rats, musk deer, musk ducks, musk bugs, musk beetles; in fact, this powerful scent is met with everywhere, even among reptiles and fishes. Many of these creatures are provided with glands and pouches or bags so arranged to receive and store up for use a large quantity of this extraordinary product, the smell of which must be highly agreeable to many creatures. But the question arises, What is the use of this overpowering smell? Some animals who possess the glands and other organs similarly situated, secrete a scent so frightfully disgusting that they cannot be approached by man or other animal without suffering the most distressing nausea; insufferable is the stench of the common skunk of North America (*Mephites Americana*); many other animals have the power of exuding from their bodies the most offensive odours, by which means they escape their enemies. Among reptiles many serpents are able, when alarmed or injured, to so taint the air that those who inhale it are attacked with sickness or giddiness from its overpowering and unpleasant action.

It may therefore be fairly assumed that these very remarkable and strong odours are not possessed altogether

as pleasing and enticing means of calling together those of the opposite sex, as some writers have supposed, finding that in some instances the perfume is confined to the male sex (of which the musk deer is a good example). Nor can we determine that musk is the most abundant of all scents to be found in the animal world. It certainly appears so to us, but our powers of smelling are extremely limited as compared with many other animals. The sportsman in all countries becomes aware of his inferiority in this respect sooner than other persons, for he well knows the power of smell in animals—the extraordinary distance they detect, by the nose alone, the presence of an unwelcome visitor; and this knowledge suggests the probability that we are in ignorance of, and have not the power to discover, a multitude of different scents, odours, or perfumes, enjoyed and perceived by many of the lower animals. Take the dog, for instance. How readily he finds the spot that has been touched by the hand or foot of his master, and follows it up, and this in a crowded street or city, where hundreds of feet have been trampling over the same ground for hours before and after his master had passed. The dog, however, must not be looked upon as possessing the organ of smell developed to anything like the perfection to be found in some other animals. The delicacy of the olfactory nerves, the elaborate and almost complicated arrangement of the nasal organs met with in some animals, cannot fail to strike the comparative anatomist with wonder and astonishment, on comparing these structures, and show him how insignificant and feeble are our means of ascertaining the nature of the objects by which we are surrounded, by the smell. Few animals will taste that which is not good for them. Most wild animals have the power of discriminating, by smelling, that kind of food suited to their wants, and by an almost

or apparently supernatural means discover it. Not a little remarkable is the fact of training or educating the nose. The best and most easily-recognized examples of this kind are, perhaps, the dogs that have been trained to find truffles or other objects upon which they do not feed. That we possess this power, but in a limited degree, is obvious, and many singular instances can be adduced in the case of persons such as are known as judges of tea, wine, cheese, etc. They are generally called tasters; the best judges however do not taste, but are enabled by constant practice and training to discriminate, with wonderful accuracy, any particular flavour or kind by smell alone.

The sense of *smell*, like *sight* and *hearing*, among our own species, is wonderfully varied, and it constantly happens that the individual most gifted in the one sense is deficient in one or more of the others, and we must admit our inferiority in all these senses as compared with the lower animals, for the sense of smell in man as compared with a dog sinks into insignificance. His sight, compared with an eagle or vulture, is equally feeble, and his power of hearing is duller than a barn owl. Nevertheless, man has advantages that far outbalance these apparent deficiencies, because he can train or educate his nose, make telescopes and microscopes for his eyes, and hear all that he may require, and sometimes rather more. Now, apart from mere fancy, fashion, whim, or caprice, there can be no question or doubt that certain scents or perfumes are liked or disliked by different individuals, and many very curious instances of this variable love of odours are to be met with. How frequently are those persons who keep pet dogs astonished to find their otherwise clean and well-behaved favourite enter the house, after having explored the dunghill or the dusthole,

with the most abominable and stinking thing that could be found, either in his or her month, or, still worse, bedaubed all over its body, having apparently enjoyed a good roll in the filth, often sufficiently strong to poison, or nearly so, the whole family. A dead and putrid polecat, stoat, or weasel, is almost sure to be thus favoured. The smell arising from some animals when at a great distance may be very agreeable to some persons who are horrified by it in close proximity. This is particularly noticeable with regard to musk, and the persons engaged in obtaining the pod, as it is called, from the musk deer suffer severely during the time they are engaged collecting it.

A singular instance of this nature occurred to a young man in London some years since, when dogs were more plentiful than at present. He had removed from the carcass of a dead civet cat the bag or glands containing the musk, and thinking to turn the perfume to account, after rolling the parts up in paper, placed them in his pocket and went his way. The first dog he met followed him closely, and was soon joined by others, until he was obliged to seek refuge in a public-house. All his kicks and attempts to drive them off failed, and until he procured a long whip he was in danger of being attacked by the mongrel lot that followed him. He and his clothes became so saturated with the odour that for some time he could not venture out in the streets without a whip to keep the dogs off. In the end he was obliged to destroy his clothes, as his friends and family could not remain in his company, the stench was so abominable. Probably the animal from which he obtained the bag was diseased, and the secretion unhealthy or abnormal. It certainly was not agreeable to himself or to any who came in contact with him, except, perhaps, the dogs that followed after

him, and even they, perhaps, like their fellows who rolled in the muck, only wanted to perfume their jackets—there is no accounting for taste. That we should seek some powerful perfume, and that the extensive use of scents should be almost universal, is not a matter of surprise, because, imperfect as our nasal organs may be, to those whose habits of cleanliness are as part of their existence, when mixing with a crowd of their own species who neglect or seem to prefer remaining unwashed, the almost painful sensation and consciousness of filth is intolerable, and the highly-sensitive person cannot help feeling degraded at being compelled to remain in an atmosphere that almost stifles and chokes him.

HORSE-DEALING.

Apropos of horse-dealing, Mr. ——, a dealer in rabbits, guinea-pigs and pigeons, who was in the habit of supplying the Gardens with these articles of food for the animals, knowing that a great number of horses also are required, felt that he could extend his business by supplying horses as well as other small fry.

He thought to secure, in time, the patronage of the Society, and then provide all the live stock used as food for the animals in the collection.

His first attempt was, for him, rather an unfortunate speculation. He appeared one morning at my gate with his first equine specimen, a poor, miserable, bony pony. I at once told him it was not good enough for our purposes, and he was much astonished when I refused to have it at any price. He appealed to me by saying that it was the first transaction of the kind he had ever attempted, that he had kept the pony for a fortnight, had fed it well in the hopes of fattening it, and that it had cost him altogether about fifty shillings. Of course it was quite optional on my part to believe this statement, and, turning a deaf ear to his entreaties, I ordered him to take it away, as I would not allow it to come into the Gardens, even as a gift. A few days after he came with a supply of guinea-pigs and pigeons, which I bought of him at the usual price commonly paid for such commodities. After I had settled with him, and he was leaving, I felt a little curious to know what had become of his valuable pony. "Well," said

he, "I sent my boy with it to the knacker's in Maiden Lane, and told him to sell it for the most he could get." "Then," said I, "you have sold it all right?" and he answered yes.

Thinking he looked rather dejected, I said, "Now, what did you get for it?" "Well," said he, "you would hardly believe it, the boy brought me back *eighteenpence.* This is my first and last attempt to become a horse-dealer."

In my experience it was the cheapest living pony of which I had ever heard.

SERPENTS.

Of all the animals in the world none inspire mankind with so much loathsome horror and dread as the serpent. Both ancient and modern writers speak of them with feelings of hatred and disgust.

"The serpent that did sting thy father's life now wears his crown." SHAKESPEARE.

For many years it has been part of my duty to study, and thereby to become acquainted with, animals of this class, and it has been most interesting to me to learn the amount of power some of them possess to destroy the life of the creature they attack.

Some of the following narratives will explain the danger to which many persons unacquainted with the subject may be exposed, by incautiously handling or approaching too near to these much-dreaded reptiles.

The poisonous serpents are more to be feared, notwithstanding their smaller size, than the monstrous constricting serpents, as the latter are more easily avoided, and, moreover, they are less numerous than the smaller harmless or non-poisonous kinds.

Many of the small poisonous species, as well as some of the large and powerful kinds, are abundant in moist and gloomy tropical forests, where they hide on the branches of trees concealed by the thick foliage, from which they dart upon the unwary; nor are they absent from the plains

and deserts. The most dreaded snakes, on account of their venomous character, are found lurking just beneath the surface of the sand, the colour of the snakes so closely resembling the surrounding objects that even if they were not buried they could easily be overlooked by the unpractised eye; while others, like the cobra and hamadryad, hold their own in the bamboo hedges and clumps of bamboo so conspicuous in all Eastern countries. In these clumps (especially in gardens) they are very plentiful, no doubt attracted by the rats and mice which keep generally near large towns and houses. The stranger who finds himself suddenly located among these obnoxious and dangerous snakes is naturally filled with apprehension, and forced to regard them with abhorrence and aversion; therefore, it cannot be a matter of surprise that these reptiles should inspire the mind with feelings of fear, and the horror and dread of death through such creatures appear to justify our natural repugnance towards them.

TALE OF A BOA CONSTRICTOR.

My friend J—— wrote me that he had a monster in the shape of a boa-constrictor. What its length was in his imagination I now forget, but on seeing it I found it of large size, and thought it probably 18 ft. to 20 ft. long.

Not intending to purchase the animal, and seeing several sore places on its skin, I was induced to ask some questions about its history, and the following statement I have every reason to believe to be perfectly true.

J—— said that the captain who brought home the serpent expected a large sum of money for it. The animal had been confined in a long chest in the ship's hold, and had not been looked at since it was caught and placed in

the box, where it had been for about three months, until the arrival of the ship in England.

The weather was very cold, and upon the box being opened the snake appeared to be quite dead; it was lifted out and placed upon deck apparently lifeless. "Well," said J——, "it will make a fine skeleton, and I will give a trifle for it for that purpose." Not caring to throw it overboard, the captain told him to take it away, which he did. Upon reaching home he remarked to his wife that sometimes these things are only torpid, and, if properly warmed up, come to life again.

Now Mrs. J—— knew well the value of a large boa "all alive," and, without loss of time, made up a good fire in the kitchen, which was on the same floor with the shop and parlour; the large serpent was removed from the box and laid out in the most convenient folds on the hearth.

Mr. J—— going out on some business, left his wife to prepare the dinner and mind the shop. In front of the fire was suspended the joint of meat, and on the hob was the saucepan of water for the vegetables; all was going "merrily as the marriage bell."

Presently two ladies came to the shop to purchase a pet bird or two, and as ladies are apt to make a long job of these little matters, their stay was rather perplexing to Mrs. J——, whose thoughts of spoiling the dinner by her absence from the kitchen more than once nearly caused her to offend these tiresome customers.

Having got rid of the ladies Mrs. J—— rushed into the kitchen, when she was somewhat startled to find the floor flooded with water, the fire nearly out, and the boa *non est.*

Now the only way to account for this state of things was that Mr. Boa had awakened from his long nap and had made his exit by the only way he could find, viz. up

the chimney, and by squeezing between the saucepan and fire-place had turned over the former, thereby nearly putting out the fire and swamping the place. Mrs. J—— was a lady not to be unnerved by trifles, she had been from birth used to wild beasts, so looking with an experienced eye up the chimney, she espied the object of her search. The end of the reptile's tail was hanging quietly in the corner of the flat recess just above the fire-place (so common in old houses), which had been selected by this scaly monster as a secure resting-place, quite warm and, no doubt, comfortable to his cold body.

No sooner seen than taken in hand, for a strong and courageous woman will sometimes in an emergency act as coolly and determinedly as the most daring of the other sex; so down she pulled, in sailor-like fashion, this monster boa until the neck was in sight, at this she grasped just below the head, and into his box she tumbled him.

COBRAS.

The following is an account of the death of the keeper, Girling, caused by a bite from a cobra. Girling at the time (October 2, 1852) was keeper in the Zoological Society's reptile-house. From the testimony of his fellow-keeper, Girling had been out all night drinking, although when he returned to his duty in the morning his condition was not observed. Soon after he entered the room he terrified his assistant by taking from the cage the Indian cobra, holding it up and telling his companion that he was inspired. He held the serpent before his face, when with a lightning-like dart the beast struck him with his poison fangs across the nose and between the eyes, inflicting several punctured wounds. He instantly threw the snake

into its cage; the blood was then slowly running down his face.

About five minutes after this occurred I met him, when he appeared alarmed, and exclaimed, "I'm a dead man." He walked backwards and forwards for a few seconds, then, apparently recovering himself, said, "I'll not give up," and going to the sink bathed his face with cold water. While this was going on I sent for a cab and also for a medical man. The cab arrived before the doctor, and I sent two keepers with him in the cab to the University Hospital; on arriving there it required all their assistance to get him from the cab into the hospital.

A variety of means were used to try and recover him, but he died within an hour after his arrival at that institution.

NARROW ESCAPE OF A FAMILY FROM DESTRUCTION BY PUFF-ADDERS.

Having received information from a dealer at the East End of London that he had a fine lot of newly-arrived snakes for sale, I paid a visit to his house for the purpose of viewing them.

Upon entering the parlour I found the wife of the dealer busily engaged in removing from a box, of rather capacious dimensions, a number of torpid puff-adders, some of them of large size. These deadly creatures she was quietly placing upon the hearthrug before the fire. One or two children were, at the same time, playing about the room. I could scarcely find words to express my astonishment at what she was doing, and my dread at seeing her in such imminent danger; she was handling them as if they were so many eels, thinking that, by their being so inactive, they were perfectly harmless. I at once

cautioned her not to touch them, and I took each one by a pair of tongs and put it back into the box, meanwhile telling the woman of the fearful death from which she and her family had just escaped. Her intention, by placing them before the fire, was to revive them, as the weather was extremely cold at the time. To this fact her escape was due, as, had they remained a short time exposed to the warmth, it would have been next to a miracle to touch them without their biting the person who attempted to handle them.

THE SAILOR AND THE COBRA.

One day a sailor came to the Gardens and asked for me. When I went to him he held in his hand a very old and ragged rice-bag. He said, "I've got a fine stinging fellow here for you." I asked what he meant, so he opened the bag and showed me one of the largest and fiercest-looking cobras I had ever seen. I felt somewhat alarmed lest the brute should attempt to escape out of the bag, so I advised the sailor to remain quiet until I obtained, from an adjoining room, a large fish-globe, into which I told him to drop the serpent, bag and all. I then well secured the top. I asked him how he became possessed of this dangerous creature. "Caught it among some timber," said he, "on board a ship at Blackwall, just home from India." "And how did you get here with it in that old rag?" "Well," said he, "I took the train from Blackwall, and the omnibus from Fenchurch Street, and he" (meaning the snake) "was quite still all the way." "What do you want for it?" "Ten shillings and my expenses," which I paid. He asked me if I would take another if he caught it, as he had seen one larger than the one he had brought with him.

I gave him some good advice, and told him the danger to which he had exposed himself and his fellow passengers by train and omnibus. I explained to him the best method of catching and bringing to me the next one he found, but I never saw any more of him, so I am inclined to suppose he failed to capture the second cobra.

I may add that the one I bought was a fine, strong, and poisonous beast, and lived several years in captivity. No doubt this animal had fed, while on board ship, upon the rats and mice it could easily find there.

My friend Mr. Frank Buckland saw the snake and heard my story, and begged me to let him have the old ragged bag as a curiosity for his museum.

SERPENT BITE.

Previous to the death of the man Girling, who was killed many years since by the bite of a cobra in the Gardens, I had been in the habit of removing the broken fangs and attending to the diseased state of the mouths of poisonous serpents. In the Gardens serpents are frequently troubled by abscesses and tumours in the jaws, which are generally caused through injury. With the assistance of Girling I had no fear in handling them. It is, of course, dangerous work, and requires some skill and great care; but after the inquest on Girling, Mr. Thomas Wakley, who was coroner at the time, made me promise not again to risk my life by depending upon any assistant, in case he might behave like the man Girling, who in a drunken fit killed himself, or rather allowed the serpent to bite him. The occurrence is related on a previous page. I have endeavoured to keep my promise, and avoid handling these deadly creatures.

Since that time I have frequently had occasion to

handle serpents that were harmless or said to be so. I well remember an instance of this supposed harmlessness. Two snakes were brought to the Gardens and handed to me as being perfectly harmless and tame; the person who had them allowed them to crawl round his neck and creep up his coat-sleeves, and to all appearance he could handle them just as he pleased. As the species was unknown to me I put them into a bag and carried them to the British Museum in order to obtain their proper names. I accordingly introduced them to Dr. Günther, taking them out of the bag and handling them with perfect confidence. The Doctor took one of them and allowed it to crawl round his arm, and I, equally confident of the creature's good behaviour, did the same with the other one. Dr. Günther, not feeling quite sure that the species was non-poisonous, obtained from one of the published works in the Museum a description of the species, and, on reading the account given of it, found it was stated to be poisonous. We looked a little uncomfortable, and the doctor suggested that we had better return them to the bag. To this I quite agreed, and in endeavouring to do so they became spiteful; the one I held bit me, so I let it fall on the floor. To my surprise the Doctor had been similarly treated by the one he held. We laughed, and both thought it judicious and worth while to suck our wounded fingers or thumbs. We also inquired of each other if any particular sensations were felt. Fortunately we experienced no inconvenience, and, therefore, came to the conclusion that the bite was harmless, and that the species was easily offended and objected to be thrust into the bag.

OFFER OF £500 FOR A MONSTER BOA-CONSTRICTOR.

The following letter appeared in *Land and Water*, June 16, 1877, from a correspondent in Venezuela, giving an account of an enormous serpent that existed in the neighbourhood of Maturin. The account was to my mind fabulous.

"*Caraccas, Venezuela,*
"*April* 16, 1877.

"I saw an interesting account of an anaconda you have in the Zoological Gardens, which appears to be considered of immense proportion.

"In the Eastern States and in the small rivers which flow into the Orinoco there are large numbers, much larger than the one the Society has. About two leagues from a friend's house at Maturin there is one living in a large pond, whose length is little short of 36 ft., and about a yard in *diameter*. My friend, Mr. G. F. Tucker, would no doubt be happy to give you further information, as he is desirous, and has been trying for some time past, to catch the reptile alive, which is very difficult, it being very shy. My friend has only seen his full length on two occasions, when he was able to take a fair measurement."

As I thought there could be no harm in taking notice of the statements, I accordingly wrote the following reply:—

"Should Mr. Cooke succeed in sending to England a living serpent of the dimensions given in his letter, I can assure him, if the animal arrives in anything like good condition, it would realize at least £500."

To this I received no answer. One day, however, a gentleman, whom, judging by his style and dress, I took to be a missionary, called at my office and asked to see me. "Are you Mr. Bartlett?" said he, at the same time looking excited and angry. I replied, "I am that individual."

"You may perhaps call to mind that you wrote a letter in *Land and Water* offering £500 for a large serpent?"

"Oh yes," I replied, "and glad I shall be to get the creature."

My visitor looked very straight at me. "Do you mean to say that you ever expected to get a serpent of that size?"

"You will excuse me, but I must say I had as good a right to offer £500 for such a serpent as the author of the letter describing such a monster had to publish the account of it."

"Well, all I can say is, that your letter did me a very great deal of mischief, and warmed me up considerably; in fact, I had to leave the place in consequence. I only wrote to my friend as a joke, but the matter ended very seriously for me," and without further remark he departed.

REMARKS UPON SNAKE POISONING.

The constant supply of instances of the occurrence of death from snake bites, and the continued reference to the wonderful recoveries by the application of innumerable remedies, or so-called antidotes, form an everlasting source of contention, and give rise to endless disputes. This cannot be regarded as anything very remarkable, considering the extensive range this extremely difficult subject has, and the multiplicity of circumstances and varied nature of the matter for thought and study that are frequently presented by a host of witnesses *whose evidence and testimony appear from time to time undoubted, as they would be upon almost any other of our human affairs.* But the matter under consideration requires a more strict and careful inquiry, which can only be fully made by those who have by actual practice become acquainted with the subject.

There is a certain longing or desire not too quickly to abolish and banish from our thoughts a long-established

and strong belief, and those who come forward with that intention may be allowed to cry—

"Despair thy charm."

In taking up this subject the writer must ask the reader's consideration of the following mode of treating the conflicting statements and disputed points published in various works. Now suppose a man or other animal is bitten by a well-known venomous serpent, by what test or means can we ascertain that the man or animal so wounded has received the poison in sufficient quantity to destroy life ?

It is well known that these creatures often inflict severe wounds that are not poisoned, but the shock received on the infliction is sufficient to produce, especially upon a nervous organization, an amount of alarm and consequent derangement so as to give the appearance of actual poison. Well-recorded instances are not wanting to show that persons bitten by serpents destitute of poison have died from the effect of the bite. Some years ago a keeper in the Zoological Gardens in Dublin was bitten by one of the harmless boas, and the terror that ensued, together with a somewhat shattered constitution, proved fatal in a few hours, in spite of every aid that was promptly afforded by the most skilful medical men in attendance upon him. There is nothing to justify us in supposing that man only is capable of this panic-stricken alarm at being wounded by a serpent. Let any one who has witnessed the battles that take place between snake-eating animals and their prey say, if he can, that the victims exhibit no fear and are careless of the bites of the snakes. To say so would prove that such person is not a trustworthy observer.

It is true that the ichneumon will rush, sometimes, upon the snake so eagerly that he gets wounded, but its most frequent and certain mode of proceeding is with caution, and

by a quick dart, either upon the head or neck of the snake, disable the reptile at one bite. The oft-repeated nonsense of the ichneumon finding a remedy for the cure of the poison is now nearly exploded; the fact is, that the ichneumon dies if the poison is administered to the wound in sufficient quantity. These facts are now well established by some of the best, most competent, and undoubted authorities.

When a large and powerful poisonous serpent strikes a small animal, the blow is struck with the swiftness of an electric shock, the wounded and poisoned animal is instantly paralyzed, and frequently dies in less than thirty seconds. Having disposed, for the time, of the supposed remedy of the ichneumon and the imagined immunity of this animal from the effects of the poison, let us take a further step into this very difficult and always dangerous and unpleasant subject for investigation. How few persons can be found who are sufficiently acquainted with the subject, and have the requisite knowledge and determination to enter fully and fairly into the inquiry; for in all countries there exists a superstitious dread of snakes, and it is extremely rare to find any one, not interested in taking advantage of the fears or credulity of his fellows, who would be able or skilful enough to catch and handle the most poisonous serpents fresh from their native haunts. Certainly not one person in twenty thousand; and unless this could be done, we are reduced to believe the crafty and designing rascals known as snake charmers, catchers, etc. To such people, the handling of snakes—even the most deadly—is a very easy and simple amusement. As before stated, how few persons could be induced to touch or examine closely a creature that, by a slight stroke from its tooth, might produce almost instant death!

I must confess to having, in former years, practised, in

search for knowledge, this dangerous custom, without fear or injury; and, from this experience, I have learned to know the power they possess, and the difficulty of ascertaining when they will or will not use it.

Depend upon it there are some species that have the power of inflicting a poisoned wound which is so instantaneous in its action that it ensures certain death, not only to any small animal, but to our own species; but the circumstances may vary to so great an extent, not only as to the condition of the serpent, but also to the state of the creature wounded, that the wound may be severe and the poison trifling, or the wound may be trifling and the poison fatal.

Endless theories have been started. Pigs are supposed to be able to withstand the poison; it is possible the poison may not reach the parts that would be affected by it—the fat skin may save its bacon, or the hog may be the aggressor, and, by attacking the snakes, startle them and thus destroy them with impunity: for bear in mind these much-dreaded poisonous serpents are loth to come forward—if you want them you must seek them; they always endeavour to escape, and unless injured or hard pressed, or accidentally come upon, keep out of the way.

There cannot be a doubt that a large number of the deaths recorded as attributable to snake-bites, if fairly and correctly ascertained, are due to causes not suspected.

The conclusion I have arrived at with reference to the poison of the larger species is simply that, in severe cases, its action is so rapid and fatal that all remedies are futile, and that a vast number of cases of injury are at once taken in hand; and in the case of but a small quantity of the poison (or perhaps none at all) having been received, the sufferer recovers, and a wonderful cure is announced immediately.

ANACONDA.

Some time ago I purchased a large anaconda for the Zoological Society's Gardens.

Some two or three weeks after being safely deposited in the reptile-house it voided a mass of feathers, a few bones and grain, together with a large brass hook (not barbed) 4 to 5 in. in length, and $2\frac{1}{2}$ in. broad, *i. e.* from point to shaft, and with a portion of line attached. I can only suppose that a bird, the curassow, had been used as a bait, and, in all probability, was the means of the successful capture of the anaconda.

The curassow is the size of a large capon fowl, and it is impossible to say whether the bird was used living or dead for the purpose of securing the snake; it is not however probable that the beast would have taken a dead bird.

Upon one occasion a newly-imported anaconda was received at the Gardens. There was soon after found a quantity of voided excreta, which, after being carefully examined, was found to contain a quantity of coarse black hair, with a few portions of bones and some teeth; these remains proved to have belonged to a young spider monkey.

A similar circumstance was noted upon another occasion, while examining a deceased anaconda. In this case the hair, teeth, and other remains were satisfactorily shown to have belonged to a young capabara. The capabara is a very great frequenter of the streams and rivers in South America where the anaconda is generally found.

RUSSELL'S VIPER.

The first Russell's viper I ever saw alive was presented to the Zoological Society by an officer on board a steamship from Ceylon.

This gentleman told me that the snake had been given to him as perfectly tame and harmless, and that, from time to time, he had removed it from its cage and allowed it to crawl about upon the mess-table for the amusement of those on board. It happened, however, that one day a chicken escaped from the coop on deck and flew on to the cabin-table; it was instantly struck at by this, said to be, harmless snake. The chicken fell paralyzed and died in a few minutes, to the great consternation of all who witnessed the occurrence. The owner, with great caution, managed to secure his former pet in its cage, and was very thankful that, by this accidental discovery, no serious mishap had occurred. On arriving in London he presented it to the Society, and it was considered, by those who had paid attention to the subject, to be one of the most deadly of snakes.

COBRA AT LARGE.

Soon after the cobra had been eaten by the water-viper, as told in a previous page, an Egyptian cobra, measuring 5 ft. 6 in., escaped in a similar manner, *i. e.* by a hole gnawed through the bottom of the case by a common house mouse, but this time the cobra got loose in the building, which fact was not discovered by the keeper until the evening. This was a more serious matter than the previous one, because the reptile was at large, and I was at my wits' end to know what

was best to be done. Night coming on, search was out of the question, so I closed the building with the intention of searching for the brute in the morning. In the meantime I told the watchman to keep a good look-

THE WATCHMAN.

out all night in case it should have escaped out of the house into the Gardens, but, at the same time, I cautioned him as regards keeping the affair a secret. Some time afterwards I met him with his legs bound up in hay-bands (*see Sketch*).

At daylight I called my eldest son, Edward, to bring his collecting gun and prepare to kill the cobra, if possible. We all (my son, the keepers and I) entered the reptile-house and closed the doors and windows, because we

suspected that the fugitive would be hiding among the boxes and cages, which were all mixed up under the glass cases containing snakes, *i. e.* ranged along each side of the room. I placed the men at all corners of the room, and one was told off to pull out the empty boxes one by one with a long-handled hook, each man being on his knees so as to catch sight of the snake, if there. After a few boxes had been moved, sure enough there he, or she, was coiled up between two boxes. I immediately told my son Edward to shoot it, and he was obliged to lie down in order to get a shot at it. I am thankful to say the shot took effect and released all present from a most embarrassing position.

STRUTHIONES.

CASSOWARIES: THE MOORUK.

THE first specimen of the species of cassowary (the mooruk) to which this paper has reference was received in the Zoological Society's Gardens on May 17, 1857, and subsequently other specimens have been added to the collection. In 1858 a pair of these birds was obtained, in 1864 they bred and two fine young birds were reared. The female lays three or four eggs of a very beautiful pea-green colour, and the male (as is the case with all the members of the *Struthiones*) performs the task of incubation, a very serious matter with him, considering that he must be constantly on duty for seven weeks, at the end of which period the young are hatched, and very prettily-striped chicks are the young cassowaries. They are attended and brooded by the male bird only, the female not being allowed to approach them, nor does she appear to exhibit any care or anxiety about them.

There are two facts with regard to the *Struthiones* of very peculiar interest. The first is, that the ostriches of Africa and America lay white eggs, while the emus and cassowaries of the Indian Archipelago and Australia lay green eggs; the second is the peculiarity in the structure of the feathers in each case. For instance, in all the known species that lay green eggs two distinct feathers grow from one quill, while the species that produce white eggs have only a single plume on each quill. Now

this is extremely remarkable in the case of the apteryx, as geographically and anatomically the apteryx is classed with the emus and cassowaries, yet we find the apteryx has the single feather to each quill and lays white eggs. How far is this bird, then, really removed from those with which it has been so closely associated? May we account for the eggs of the apteryx being white by the fact that they are deposited in a hole or burrow in the earth, and being, like the eggs of most birds, such as parrots, kingfishers, bee-eaters, woodpeckers, etc., laid in the dark, either in banks or holes, in trees or other dark places, are found to be white?

We are, however, reminded of the extinct gigantic dinornis of New Zealand, the remains of which have shown that it belonged to the family of the *Struthiones* that grew two feathers from one quill, and consequently, if we may venture an opinion, laid green eggs; from its immense size it would be unreasonable to expect this bird to scratch a hole in the ground sufficiently large to admit of depositing white eggs in a dark place.

GREAT BUSTARD.

I had the opportunity of examining one of these species on February 14, 1861. There were present upon this occasion Dr. Sclater, Dr. Günther, and E. W. H. Holdsworth, Esq. This bird was a fine large male, not an old bird, but probably in the second year, the whiskers being somewhat developed. The most careful examination made by the above-named gentlemen and myself failed to discover any opening under the tongue. Being perfectly satisfied upon this point an incision was made in the skin beginning at the corner of the mouth, and, as in the former bird

examined, we found an abundance of the delicate membranes spread over the fore-part of the neck and throat. By inserting the end of a blow-pipe any number of cells could be inflated, and by the application of a little force the walls of these cells would give way, and thus form one cavity or several large cavities or bags. During this examination a discussion took place, with reference to the means by which these membranes were distended by the bird during life, whether by muscular dilatation or by inflation, and I must admit that this part of the subject has since appeared to me to require more consideration than I at first thought it deserved. I observed the wonderful enlargement that takes place in the wattles, etc., of many birds, as, for instance, the wattles of the Talegalla, or Bush-turkey, which distend and contract with great rapidity; a similar condition is observable in the common turkey and many other birds. A very wonderful example of this kind I have perceived in the male ostrich when under the influence of intense excitement during the early part of the breeding season. The bird will squat upon the ground, extend his wings, and spread them to the full extent, showing the white plumes, his neck enlarged to an enormous size and becoming quite red; in this state it is rolled with his head from side to side on his body, the wings alternately rising and falling rapidly with the violent motion of the head and neck, the bird appearing perfectly unconscious of your approach during this extraordinary emotion. As I have previously remarked, it is somewhat doubtful to me by what means these changes are produced. I think it may be well worthy of further investigation. But to continue my subject, on February 21, 1861, another fine male Great Bustard was examined by me, about the same age as the last, and with precisely the same result as before. The conclusion at which I arrive appears to me the only means

of explaining the existence of a pouch in the fore part of the neck, etc., in some of the old male birds of this species, viz. that some of the membranes in this part of the bird have become ruptured by the excessive enlargement that takes place during the violent paroxysms to which the males are subject on the approach of the breeding season. I have seen them with throats enlarged to an extraordinary extent, the pinions of the wings lowered to the ground, while the points of the primaries are crossed over their backs, and in this distorted state they rush on and attack each other, giving one reason to imagine that these delicate membranes at such a moment may give way and produce the abnormal condition so often alluded to as being found in old males. As a further proof of the probability of this being the true explanation, I call attention to the great difference in size and form of the so-called pouches, as given by different observers.

The fluid contained in the pouch would also be thus fully accounted for, if my hypothesis be correct.

OWEN'S *APTERYX*.

The *Apteryx Owenii*.—As its name carries with it one of which every Englishman ought to be proud, we feel called upon to give rather a full account in the first notice of this singular family of wingless birds. Captain Barclay, of the ship *Providence*, brought from New Zealand, about the year 1812, the skin of a bird which Dr. Shaw, the naturalist and ornithologist of that day, figured and described as the *Apteryx australis* in the *Naturalist's Miscellany*. After the death of Dr. Shaw the specimen passed into the possession of the late Earl of Derby, whose fine collection now belongs to the town of Liverpool, having

been bequeathed to it by his lordship. For many years (nearly twenty) this unique specimen was lost sight of, and few naturalists at home or abroad believed in the existence of a bird of the kind. Its history remained in this state until the year 1833, when the late Mr. Yarrell published, in the *Zoological Society's Transactions*, a paper giving all that was at that time known respecting this remarkable bird. On June 8, 1867, Mr. Gould brought before the meeting of the Zoological Society a skin of a second species of this interesting genus, and this he described and named, as a just compliment to Professor Owen, under the name *Apteryx Owenii*. In 1850 the late Dr. Mantell received from his son, Mr. Walter Mantell, the skin of an apteryx; this he placed in my hands, with a request to examine and report upon it. I at once pronounced it to be unlike any of the specimens of *Apteryx australis* in the British Museum or other collection known by the name, and at once wrote to the late Earl Derby, who kindly sent the original specimen from Knowsley to London for the purpose of having it compared with the specimen sent home by Mr. Walter Mantell. Mr. Bartlett at once identified these two birds as the same species, and at a meeting of the Zoological Society, December 10, 1850, brought the subject forward, and named the more common species (of which specimens were found in the British and other museums) *Apteryx Mantelli*, in compliment to that gentleman.

The importance of observing and of collecting all the evidence in our power respecting these singular and expiring races of birds cannot be too frequently urged, for doubtless in a few years hence the work of extermination will be complete. The mighty *Dinornis* and its smaller allies are probably long since numbered with the dead, and we are reduced to confine our observations of

the living representatives of this group or family of *Struthiones*, to the remaining species of *Apteryx*, and since the introduction into New Zealand of cats, dogs, and pigs, many of these latter having become wild in the bush, the *Apteryx*, like the Dodo of old, must rapidly disappear.

We have here an illustration of the value of possessing living examples of rare and little-known animals, for without the opportunity of testing the truth or accuracy of the reports of native and other careless observers, many fabulous and absurd remarks are introduced to us, and for the want of knowledge we are led to believe them.

In appearance the bird is about the size of a common fowl, the body is as round as a Dutch cheese, the bill is white, about 3 in. long, the eyes small and black, the plumage soft and hairlike, of a pale silvery grey, finely barred with darker grey. The legs and toes are white, or pale flesh colour, and about the size of those of a common fowl.

PHEASANTS.

REEVES'S (OR BARRED-TAILED PHEASANTS).

We have thoroughly acclimatized the common pheasant from Western Asia, the ring-necked pheasant from Southern China, the green-breasted pheasant from Japan, then why not the Reeves's pheasant from North China? It is certainly the largest, finest, and most beautiful of all the true pheasants, and would be a most desirable and magnificent addition to our game preserves.

Domestication and acclimatization are two very different states. Animals may be acclimatized without, in the least, becoming domesticated, and the animals already domesticated may be acclimatized, that is to say, we may transport the domesticated animals to a new country, and, with proper attention to their wants, we may succeed in establishing them, and they are in time adapted to the changed condition and thrive; instances of this kind are common enough, viz. sheep, cattle, pigs, and poultry in Australia; horses, cattle, and pigs in America and elsewhere. The introduction of animals from one country to another is very common, and the success attending such introduction well known. But when the question is asked, Have any wild species that have been introduced into a country become domesticated within the time of recorded events? an answer in the negative must be given; on the other side, we have no end of instances of domestic animals being introduced to new countries, where, for want of care and

attention, they have attained a perfectly wild state, yet nevertheless exhibit the stamp of domestic variation and a tendency to return, under proper treatment, to their former condition. We need only point to the horses of South America, to the sheep and cattle in Australia, and to the pigs and cats in New Zealand, in support of what we advance.

China must be regarded as the country the people of which have succeeded in obtaining and breeding domestic animals as an article of food far in advance of any other nation. They have the most prolific sheep that produce four and, sometimes, five at a birth, geese that lay and hatch all the year round, and pigs that produce four or five-and-twenty at a time, most of which, under the watchful care of these thrifty and careful people, are reared. We may naturally infer that those animals most subject to variation and most capable of conforming to changed conditions, were those selected for domestication, and that as a probable result the wild ones, belonging to the species that were taken under the protection of man, became amalgamated with the semi-domesticated individuals, until they ceased to exist as wild animals; hence the present difficulty of fixing or determining upon the wild origin of nearly all our domestic animals. Among deer, the reindeer is the only species that has shown a capability of being domesticated, and in a wild state it exhibits a wonderful amount of variation, not only in size, but in colour and habits, therefore clearly indicating the success that has been attributed to the Laplander, but which is, in all probability, far more ancient than this race of people — witness the very numerous remains of this animal's bones, associated with the traces of man, found in the ancient caverns of Mid Europe. There is every reason to believe that the reindeer will be preserved in a domestic

condition long after it has ceased to exist as a wild animal, owing to the rate at which these animals are being destroyed in Greenland, as stated by Dr. Hayes, and also by Mr. R. Brown in a paper published in the *Zoological Society's Proceedings*, May 28, 1868, p. 352. He says, "*They are slaughtered indiscriminately by the natives*, these improvident people, in nine cases out of ten, leaving the hides and flesh, and only taking the tongues." The fallow deer makes a near approach to the condition of a domestic animal, but fails to become perfectly so.

Many species of deer are brought from Asia and America, and thrive in Europe and Australia; antelopes from Africa and Asia thrive in Europe and Australia, and among birds from Asia we have pea-fowl, pheasants, ducks, and geese, of many species, acclimatized in Europe, but not one known case have we of either of the above-mentioned mammals or birds ever having been domesticated; while, on the other hand, we may import wild animals and acclimatize them—that is, breed from them, and rear their progeny without the slightest chance of bringing them (the progeny) under domestication.

Animals to become domesticated must be of those kinds which are easily changed, and subject to great variety amongst themselves—in fact, of a plastic nature.

What has been done towards domesticating the peacock or guinea-fowl in this country amounts to literally or really nothing. It is true that they are acclimatized and breed freely here, but they are anything but what may fairly be called domesticated birds; certainly they are not so wild as pheasants, and although these will when bred tame feed from the hand, like common fowls, yet they cannot be called domesticated. That efforts are made all over the world to tame and domesticate wild animals—and doubtless our species always were aiming at that object—there

is every reason to lead us to believe, as the larger part of the domestic animals now known were domesticated long before our race became in any way civilized. Have not the various races of men that *we* please to call savages, at the present time, pets and domestic animals about them? And do they not in many countries keep large numbers of them as a means for subsistence and for trading? Animals, such as deer or antelopes, that are bred in confinement, are, of all creatures, the wildest should anything cause them to be alarmed. It is a well-known and authenticated fact to all who have had experience in the breeding and rearing of animals, not domesticated, that they are in their houses or paddocks perfectly tame, and that they will come even to a call, feed out of a person's hand, and will probably allow themselves to be stroked by those whom they know. Should, however, anything new or strange be placed near one of these animals, or an attempt be made to remove one to another locality, the animal in an instant becomes alarmed, its fear knows no bounds, its whole strength and determination exhibit themselves, and its wild disposition at once returns; in a word, it is transformed from an apparently perfectly tame beast, into one of the most uncontrollable of wild animals.

The difficulties and dangers attendant upon the catching and transporting wild animals of this class are known but to few persons. The cause is, however, by no means beyond comprehension. We will assume, as an instance, that a pair of antelopes are imported from Africa. Before they were shipped for this country they had been caught and tamed. Large numbers die in the process, and it is only occasionally that the people who attempt or undertake to tame them succeed. The animals are then confined in a small space and sent on board ship. Out of a large number shipped but few survive the voyage, and those that reach

England are so completely tamed and subdued that their original wildness and determination never return. So thoroughly subdued are they, so used to almost every kind of noise, of sight, and of change of condition, that they continue manageable all the rest of their lives. It is not so, however, with their offspring, which are produced in what we please to call a state of domestication. In most instances the breeding, in captivity, of wild animals is attended with considerable difficulty and risk, consequently the young are regarded and treated in the most gentle and kindest manner. You must not do the slightest thing to frighten or annoy them. You look at them, talk kindly, pet and feed them with the best and most tempting of food, and they appear perfectly tame and fond of being fed and caressed, but only let some trifling strange thing happen, sometimes the appearance of an umbrella or anything moving in the bushes, or a boy's kite in the air, and away goes all the tameness at a moment's notice, the creature rushes at the fence, and, if possible, breaks its neck or legs, or, in its frantic alarm, breaks loose by either smashing the fence or leaping over it, and not unfrequently is so injured that it either kills itself or is obliged to be killed. The simple truth is, that the wild and vigorous natures of these animals manifest themselves only under the influence of fear; endless instances in support of the above have occurred in this country and on the continent; in fact, wherever wild animals have been bred in captivity, the vexatious losses which those who, after years of trouble, meet with in an instant, are most trying and disheartening.

Another fact with reference to tame-bred or artificially-reared animals is well worthy of mention. No animal is more dangerous than one that has been reared by hand, whether it be a bull, a stag, or a ram; having no fear of man, woman, or child, at the season when the animal

becomes adult he is liable without notice to attack and kill, or much injure, the persons who have petted and reared him.

ON REARING PHEASANTS AND OTHER BIRDS.

A few remarks upon the breeding and rearing of the young of the various kinds of game birds and of domestic fowls may, at this season of year, be acceptable to those of our readers who are interested in the subject.

Although most breeders, especially gamekeepers, know, or profess to know, everything required to attain success in those matters, yet it is a notorious fact that a vast number of them meet with disastrous failures, through causes quite unforeseen by, and unknown to, those who pretend to be so thoroughly acquainted with the subject, that, according to their ideas, to be unsuccessful would be an impossibility.

Of all diseases that prove fatal to the young of the gallinaceous birds none is more to be feared and to be guarded against than that commonly called the gapes. This troublesome disorder is so well known that it does not require more than a passing remark. It is caused by the existence of a parasitic worm in the trachea or windpipe of the chick. The attempts of the unfortunate bird to expel, by coughing or sneezing, this leech-like bloodsucker are most distressing, and the increased size or numbers of the worms so obstruct the breathing of the bird that it dies partly from its exhausted state and partly from the complete obstruction in the breathing or air passages.

There is scarcely a gamekeeper in the kingdom who has not a certain cure for this fell complaint, and many profess to know at least half-a-dozen perfect remedies, but, like most quacks, when applying any one of them, it fails to effect a cure, and the death of the patient is attributed to some other cause.

Gamekeepers are, as a rule, extremely tenacious of imparting reliable information, or any information, that can be taken as of much value; most of these people are shrewd, and pretend to have some wonderful and mysterious secret. They frequently mislead, by their crafty and unprincipled information, those who seek it, thus rendering their statements unworthy of the attention so often bestowed upon them. Many of the so-called specifics are decoctions of various noxious herbs, roots, etc., and no doubt, in some instances, do destroy the parasites in the trachea, but, unfortunately, they at the same time completely undermine the constitution of the young birds; therefore the much-vaunted remedy is little or no better than the disease. Other means are often resorted to in order to rid the chicks of these fearful tormentors, such as giving them camphor pills, turpentine, tobacco-water and tobacco-smoke, and putting them in a box and shaking fine lime-dust among them, which they inhale while in the act of breathing; this caustic powder will kill or cause to be expelled the worms, and as frequently will kill the chicks. Another plan is by inserting into the trachea a feather oiled and dipped into finely-powdered salt or tobacco-water, and by a twist round draw out the worms; to accomplish this object the dried tongue of a woodpecker is not unfrequently used. In fact, there is no end to the so-named cures for this most troublesome disease; a few may succeed, but the greater part fail, in spite of the most anxious perseverance and attention.

It will be, it is hoped, shown that this destructive complaint can be avoided by attending strictly to one very simple rule—viz. that all water used in the food or preparation of the food should be boiled before it is so used. The object aimed at by boiling the water is the destruction of the eggs or germs of the parasite.

This means of preventing the disease first suggested

itself to the writer, by the many instances of the immunity of the young birds from this much-dreaded pest through the frequent use, at different breeding stations, of various kinds of decoctions or infusions of herb roots, etc.; but, at the same time, many of the chicks suffered on account of the nauseous drink and medicinal food, thus rendering the attempt at prevention only a partial success.

It, however, suddenly occurred to him that the boiling of the water used in the preparation of the decoctions was probably the secret of the success, and subsequent considerable experience has fully confirmed this opinion, and he is induced to advise its adoption, trusting to hear the result when fully and fairly tried upon a more general and extensive scale: it must be admitted that no harm can arise by its adoption, and the little additional trouble is one of its strongest recommendations. The floor or ground upon which the chicks are first allowed to run should be covered with finely-sifted dry burnt earth or sand, free from all kinds of growing vegetation; for there is no doubt that the spores or germs of the parasite are taken up by the chicks in the water or heavy dew and moisture that hangs upon the plants, etc. Much depends upon the locality, the state of the atmosphere, the temperature, and also upon the freshness or staleness of the spot; the shifting from place to place, season after season, has always been found most beneficial, but if the ground be freshly covered with recently-burnt earth, it is rendered perfectly fresh, and much trouble and risk is thereby prevented. The avoidance of the evil must be far in advance of the best remedy ever known or likely to be found. Opinions differ in reference to the various kinds of food used to raise chicks, be they pheasants, fowls, or other *Gallinæ;* much depends upon the situation and circumstances, and success is obtained in various ways. As a general rule the greater variety in the food and the more frequently it is changed,

the better. Overfeeding and want of exercise are the frequent cause of failure, but upon the skill and judgment of the feeder all depends, no fixed rule can apply in any case. The weather, if it be damp and cold, or dry and hot, necessitates change in and attention to the management of the birds. But, above all, cleanliness is of the utmost importance, and must be most strictly observed, and nothing is more likely to prove fatal than tainted or sour food.

Hard-boiled eggs grated and mixed with a little fine meal, baked custard, made by mixing new-laid eggs with milk, mixed with meal, Indian corn-flour, a little pea-meal and oat-meal or barley-meal, should be the food. This mixture should be made sufficiently stiff to crumble. When they get older, fresh finely-chopped green food, ant eggs [1] or other insect food, such as grasshoppers and gentles. Gentles used in a green condition, that is, freshly taken from putrid flesh, are apt to scour or poison the young birds, and are therefore dangerous, if used too freely and without great care. On no account let them be used until they have been well cleansed. For this purpose they must be kept some days after they are removed from the flesh upon which they have been feeding, and placed in damp sand or fresh earth, to sweeten and purify them, and even then used very sparingly. The sooner the young birds begin to feed upon seeds the better, and, in order to tempt them, cut groats, a little millet and canary-seed, together with bruised hemp-seed, should be sprinkled about with the other food.

[1] Fresh ant eggs are preferable, but a good substitute are the dried or prepared ant eggs obtained in large quantities from the continent; these, when mixed with moist food, answer very well not only for the young pheasants, fowls, etc., but also for nightingales and other warblers.

STORKS.

TAMING STORKS.

HAVING been asked my opinion regarding the habits and nature of the common white stork (*Ciconia alba*), and its adaptability to be kept as a garden pet, I have thought it would answer most of the inquiries if I were to write a few notes upon the subject. In the first place, in order to keep a pair or more of these birds, the garden must be one of large size, and all choice and small or delicate flower-beds must be so protected that the storks cannot walk upon the flowers and spoil them, not only by crushing, but by soiling them with whitewashy excreta, so freely given off by these birds. With reference to their tameness, I know of no bird that so soon becomes tame; the fact is, they are for the most part tame bred, for in Holland and many other places the arrival in spring of the storks after their winter migration is a most welcome and cheering time. The birds alight on the house-tops, and visit the streets and market-places about the towns and country houses, and no one attempts or dares to molest or injure them. They are so perfectly at home and so kindly received that they at once repair their old nests, which are generally on the highest part of the houses or other buildings, the nests being composed of sticks and all sorts of dry rubbish, on which they lay three or four white eggs. In about a month they hatch and the young are reared, the old birds feeding them upon rats, mice, frogs, fish, young water-fowl, reptiles, aquatic insects, worms, and any

kind of offal or other animal substances. Now, although the stork is naturally tame, it is not exactly the sort of bird of which to make a pet—at least for children. Its sharp and pointed bill is very apt to be used and directed towards the eyes of any one who may attempt to take any kind of liberty with it, or in any way interfere with the liberty it takes in trespassing on or about the premises. The bird is, however, easily driven off, and rarely offers any resistance. The stork will bear our winter tolerably well, considering that the habits of the bird are migratory, leaving the northern parts of Europe about the month of September to pass the winter in Northern Africa, Egypt being visited by large numbers. It is only by constant attention, however, to provide it with food during the frost and hard weather that the bird can be kept, and an open dry shed for the bird to take shelter in is about all that has to be supplied. While upon the subject of tame pets, I may mention that my experience (which is somewhat extensive) has convinced me of the danger that may be encountered by placing too much reliance upon the good-nature of very tame animals. A tame stag during the rutting season is a caution, and if you meet him alone, you soon find it necessary to retire. Few ruminating animals, during a certain part of the year, are to be trusted, and the tamer they are at other times renders them the more to be feared. Having no fear, they generally attack you, whereas animals that are perfectly wild fear you, and rather fly from you; in fact, in most instances you find it difficult to get near them.

THE TRUMPETER.

(*PSOPHIA CREPITANS.*)

TRUMPETERS are great pets, and well they may be, not only on account of their wonderful intelligence, but they are beautiful in form, and delightful in colour; most inquisitive and easily taught to attend to other birds. I have met with one that was fond of rearing chickens; it would walk about, pick up and drop morsels of food to the little chickens that surrounded their long-legged foster-mother. The trumpeter is fond of society, and will follow the person about to whom it becomes attached.

SWANS.

The species of swans are somewhat limited in number. The common tame swan, the best-known of all, has been recognized as an ornament on the various rivers and lakes, both public and private, for many generations; but unless these birds are pinioned, that is, the primaries of one wing kept short or the primaries removed by separating them from the wing at the carpal joint, the birds are apt to stray and fly from their homes.

There are two other species which are met with occasionally in England, the Hooper and the Bewick swan. There is also the Black swan of Australia, the Black-necked swan of Chili and the Falkland Islands, a small species of swan called the Coscoroba, also a native of Chili, and the Trumpeter of North America.

The swan has been considered and regarded by some persons as a domestic bird. The question may be asked, What is a domestic bird?

In the first place, unless the swan is mutilated and deprived of the power of flight, so soon as it is adult it reverts to the wild nature and disposition of the species.

It is not on this account, alone, that it can be argued that the swan is not a domestic bird; there are other reasons to be advanced in order to show that the species has not undergone any alteration in its size, plumage, or habits after being kept for upwards of four hundred years under control by the practice of pinioning, for unless the cygnets were pinioned they would escape from their

owners, if allowed the use of their perfect wings. I think these facts ought to hold good in support of the opinion that the common or mute swan is still undomesticated, because however tame it may be, the tameness of the bird is no argument that it is a domestic animal.

It is quite true that the swans reared at Abbotsbury Swannery, the property of Lord Ilchester, where I have seen two thousand adult birds and five or six hundred cygnets within a mile and a half of the spot where they were hatched, are allowed the full use of their wings. Out of this large number many occasionally desert his lordship's grounds. I have seen from two to three hundred deserters on the coast, about Weymouth and the Isle of Portland.

It was well known to whom they belonged, as a large number were missed from the swannery; it was in the early spring of 1882, and a very large proportion of these swans was lost.

In 1878 a case was brought by the Society for the Prevention of Cruelty to Animals before a full Bench at the Slough Petty Sessions, against J. Abnett, waterman, of East Moulsey, in the employ of the Vintners' Company, for having cruelly ill-treated and tortured four swans by cutting the mandibles with a knife and plucking feathers from the wings.

Inspector Nicholls, Superintendent Whitehouse, and a Veterinary Surgeon went up the Thames on August 8, 1877, to see the swan-upping. Hamilton, the Queen's swan-herd (now deceased), was marking the swans, and Hicks and Abnett were assisting. After a considerable amount of evidence for and against had been given, the Bench dismissed the case, it being decided that the defendants were not guilty of cruelty in carrying out a practice that had been in use for centuries.

POLISH SWANS.

There is no doubt that the so-called Polish swans are sometimes produced from birds that are to all appearance the common mute swan (*Cygnus olor*). Many years ago, when at Cambridge, Professor Newton called my attention to a pair of common swans that had bred, and the young birds were white when hatched, and continued to exhibit all the characteristics of Polish swans. This leads me to consider the subject of albinos, for it appears to me that we have several varieties of albino birds and other animals; in the first place, the pure albino may be described as purely white with pink eyes, having no colouring pigment in its system. Now I find a great variety of these conditions. The so-called Himalayan rabbits have perfectly white bodies, but black legs, ears, nose, and tail; at the same time, they have pink eyes. I also find perfectly white guinea-pigs with dark eyes. Among birds I find purely white jackdaws, blackbirds, Java sparrows, and other white finches with dark eyes. All these varieties I regard as semi-albinos. I have thus arrived at the conclusion that the so-called 'Polish' swans belong to this group, and are semi-albinos, because they have the black marking round the base of the bill and the dark eyes of the common swan.

BIRDS OF PARADISE.

(PARADISEA PAPUANA.)

When the first two birds of paradise arrived at the Gardens their plumes were quite short, say about 5 in. long; the birds having moulted, the new feathers were growing in a thick bunch on each side, below their wings. The birds, however, appeared in good health, and were active and lively. I soon found how fond they were of meal-worms and other insects, they fed freely upon fruit, rice, etc.; a little cooked meat was also acceptable to them. During the voyage they had been supplied with living cockroaches, and a tin containing a number of these insects came to the Gardens with them. Their mode of hopping about from perch to perch and clinging to the bars or wires of the cage, reminded me of a jay or jackdaw. They were fond of a bath, and were very careful in dressing and drying their fine plumes. The new feathers were about two months in arriving at full perfection, and it was a charming sight to see them in full plumage. When they uttered the loud call-notes, the first sounding like "cor-cor-cor-cor," repeated with great rapidity and generally followed by "whark-whark-whark-whook-whook," and terminating with a low guttural sound pronounced with great energy, I was struck with wonder. During this vocal display the bird would bend the body forward, and straining the wings wide open raise them upwards, frequently over the head; at the same time it

erected the beautiful plumes, spreading them in the lightest and most graceful form, causing every feather to vibrate, like a flame of fire, that almost dazzled the sight. While this excitement lasted the bird would sometimes turn almost under the branch, or perch, by bending the head or neck very low and downwards. At this period the two birds would not agree; they attacked each other, and eventually the aviary had to be divided into two compartments.

The birds hop about on the ground like jays or jackdaws; they do not run like starlings or magpies, which run on the ground, but when on the ground the long plumes are carried high above the back to prevent the points of the feathers from touching the ground. They soon became very tame, and would take food from the hand; the sight of a mealworm would bring them down from the perch immediately.

The moulting was extremely rapid, the fine plumes were thrown off in a few days, and the new ones appeared to grow all at the same time in a bunch; it is therefore certain that these birds after they attain the adult male plumage lose it only during the annual moults, like the peacock and many other of these richly-ornamented birds.

EAGLES AND FALCONS, Etc.

There are few animals to be found in a state of nature so wild, fierce, and powerful as most of the raptorial birds, such as the eagles and falcons, yet, strange to say, under careful and skilful treatment, birds of this Order are rendered perfectly tame and manageable in a very short time, in some instances a few days being sufficient. A clever falconer will frequently handle a newly-caught falcon and, within three days of its capture, feed it upon his fist. The great art is simply to handle the bird with such care as not to hurt or alarm it. The bird, bold and determined in spirit, finds its captor kind and gentle, using every means in his power to become friendly, offering it food, and uttering kind and expressive sounds. By his skilful manipulation he renders the bird not only unable to inflict injury upon him, but prevents it from injuring itself by using the appliances made for the purpose. Finding useless the most determined efforts to escape, and its powerful bill and claws unable to inflict injury, it, by its bright eye and keen intelligence, quickly perceives that it has a kind and generous master, and at once, as a rule, becomes attached to him. In a short time it may be trusted with the full use of its wings to pursue and capture the prey at which it may be the pleasure of its master to let it fly.

The whole of the secret in training falcons is simply to remove fear, or, in other words, to establish a kind of confidence, and no sooner has this been accomplished, than

the bird's boldness and courage returns, and it pursues its natural calling with the spirit of the wild race to which it belongs. There are many wild animals, however, whose delicate organization renders them unable to stand the severe test through which these bold and savage creatures pass so quickly. Many birds, when captured, are so terror-stricken that they are paralyzed, and for many hours are perfectly helpless, having lost the use of their legs and wings. Excessive fear not unfrequently has this effect upon many wild animals, and no doubt has led to the belief in the so-called fascination. For instance, a rabbit when introduced into the cage of a serpent may skip or hop upon its enemy, whose sudden start alarms the rabbit and causes it to remain motionless; the serpent, taking advantage of this, instantly strikes at and catches its victim, and generally kills it in the most expeditious manner.

There can be no doubt about the instruments of death supplied to the brute creation being the most perfect to accomplish the end for which they are intended, and if we could only ascertain the facts, they probably inflict less continued pain than generally may be suffered by animals that are wounded or killed by other than their natural enemies. For instance, most of the creatures that are preyed upon belong to the more timid class, and when seized, suddenly lose all power, in fact faint and become unconscious, and consequently are saved from suffering pain, dying in a state of insensibility. There are well-recorded instances of persons when seized by the larger kind of carnivora having lost the power of feeling. If I am not mistaken, Dr. Livingstone stated that he felt but little pain at the time the lion bit him, and broke the bone of his arm; a similar statement was made by Lloyd, author of *Northern Field Sports*, when attacked and

wounded by the bear now in the British Museum. Again, the rapid death of animals wounded by poisonous serpents makes their suffering but of short duration.

I trust, however, it may not be supposed that I am endeavouring to make it appear that all nature exists free from cruel torture and frightful suffering from pain and misery, this state of things being wholly inseparable from life. All living creatures have been and always must be subject to casualties that from time to time occur to injure or destroy life. Sometimes it is fire or water, or the want of these necessaries, or by the changed condition of the atmosphere or other disturbance of the elements producing disease, and sometimes by want of food and loss of life. Added to these we find throughout the world a spirit of destruction inherent not only in the lower animals, but inseparable from the highest state of civilization.

OWLS.

STORY OF PEL'S OWL.

MUCH interest is taken in this class of birds, and great is the mystery and superstition supposed to surround it, especially by the most ignorant and untaught of every nation. This arises generally from the fact that owls roam about at night in search of food, their eyesight being peculiarly adapted to enable them to see in the gloom or twilight, and the structure of the wings being such that they can fly unheard. The noiseless flight, the large and glaring eyes, the hollow and dismal voice, heard in the still darkness of night in woods or in old untenanted castles or buildings, all tend to encourage and heighten the idea of supernatural agencies (the bird being often regarded as a ghost or a spirit of darkness), which idea once possessed is rarely if ever dispelled. The stoutest heart might quail if startled by a combination of these circumstances, and have a grave suspicion aroused as to the true nature of these apparently unearthly midnight disturbers. No class of animals can furnish a more abundant crop of wild stories and frightful midnight alarms than the owls. As an instance of the former we cannot do better than give an extract from the *Ibis*, referring to Pel's owl (*Scotopelia peli*), vol. i. 1869, p. 447, which is as follows:—

MEMORANDUM BY COL. O'CONNOR, C.B., LIEUT.-COL. 1ST W. I. REGT.

(*Sketch of Nero, the Owl, a "Feetish Bird," from the River Gambia, Western Coast of Africa.*)

"During seven years' exploration of Western Africa I only met with one of the species of the owl 'Nero.' He was brought 'a chicken,' full of pen-feathers, or rather down, of a delicate straw-colour, and very thick, from a lagoon in the Barra country. No native would admit 'Nero' as a visitor; and when the bird was installed in Government House the servants and head people came in a body to remonstrate, asserting 'he was a Gumbi owl,' 'a Feetish'!!! and would 'destroy and kill any object he looked on.' The chief groom (an old soldier, who had charge of the poultry) insisted that 'every cock and hen would go dead.' Strangely enough, an epidemic broke out, and carried off from fifty to sixty head of fowls; and each day the groom placed the defunct birds on the steps of Government House to meet the eye of Mrs. O'Connor, seeming to exult in the mortality among the feathered tribe. 'You see wid your own eye, Missus, dat Debil Jumbi bird, he go kill all de fowls; Govenor think he hab long head, but he no sabey owl. Suppose you meet him in de stable, he see Nelly (Mrs. O'Connor's favourite mare), de horse he go tumble down dead.' Death at last ceased to reign amongst the poultry population, and 'Nero' became my principal pet; he ranged over the piazza, perching on the branch of a tree; he was fed regularly by the orderly on roasted fish, but he often came to the dinner-table and flew down for scraps of meat, bread-and-butter, which he took gently from myself or Mrs. O'Connor, permitting us to rub his head, crest, neck, and back, seemingly enjoying the caressing, but he would snatch meat or bones from the cat or dog, and when the eagle was introduced into his company he beat him in a most unmerciful manner away from his peculiar and original portion of the piazza, the eagle being one of the fiercest and most pugnacious of African birds, brought from the upper part of the Gambia river, near 'Wallie,' and when in vigour, able to carry away a kid or small lamb. 'Nero' luxuriated in a tub of water, frequently washing himself, and perching on the rim until dry. He was wont to go out to the garden or fields, where instantly an immense commotion arose among all the birds; the larger ones flew round the owl, keeping a very civil dis-

tance; the smaller birds flew away, but 'Nero' treated both alike with sovereign contempt. He would return of his own accord to the roosting-place in the piazza, and when put out and confined for some days, rejected all food, and pined until restored to his perch. With me he was as tame as any canary, and, after an absence of two months, recognized my voice when I went to his cage at Oatlands (Devon), appearing much pleased by my taking him out for a walk on the grass. Many natives from the interior told me they had not seen such a bird before, but they considered him *unlucky*. I really think 'Nero' is nearly *sans* any relations, and certainly devoid of all friends in Western Africa.

"*Sept.* 13, 1859. L. S. O'Connor, St. Mark's House, Jersey."

Now, all the laughing at the superstition of the poor negro will not prove that the white population of our own country are quite free from the belief in, and dread of, the supernatural, and it is a great mistake to suppose that education and the so-called high state of civilization is a preventive of a tendency towards superstition. The educated can conceal, from fear of shame, their thoughts and impulses, but the uneducated and poorer classes speak openly and unguardedly and without the fear of publicity; thus the miserable fortune-teller is frequently exposed and brought to justice. How many persons of rank and fortune are daily being deluded by spirit-rappers, and other swindlers of this class, yet how few have the courage to come forward to admit their own folly by exposing the deception of which they have been dupes!

But, to return to the story of Pel's owl, and in order to illustrate the above facts, it is only necessary to remark that a living specimen of this species was brought to Europe; its demoniacal character came with it, and, strange to say, the most distressing and direst train of misfortunes befell its owner, and he was reluctantly compelled to part with the bird. By many who knew the

history of this ill-omened owl, the misfortunes of the possessor were attributed to this unfortunate *Scotopelia peli.*

Another instance of the credulity of our race respecting the owl is the tale of the French chiropodist, who exhibited outside his establishment a living specimen of the Eagle owl (*Bubo maximus*), said to be expert in extracting corns. When the sufferer to be operated upon was seated the owl was brought in and taken behind a screen, the foot of the patient was thrust through an aperture in the said screen, the wings of the bird were felt to flutter around the limb, and the operation of extracting the corn commenced; the corn being removed, the owl was again restored to its former position outside, and the patient departed in the full belief of the extraordinary power and skill of *Bubo maximus.*

GREAT EAGLE OWL.

I occasionally receive an evening visit from a friend who has a great horror at being thought nervous. On one of these visits I propose, after dark, to take a walk round the Gardens, and he agrees to accompany me, remarking, at the same time, that it is very dark, but supposes I know my way about, and that there can be no danger on that account. We have not gone far before he begins to speak about the possibility of some of the animals having escaped, and, probably, he thinks every bush or shrub is one, or conceals one. He expresses his opinion about the folly of being unarmed in such a place, when suddenly a most unearthly sound assails his ears; it is as a loud hollow double hoot appearing above, below, and behind all at once. He grasps my arm and instantly exclaims, *What is that?* I reply to his question that it's only

an old friend amusing himself, and as we come in front of the cage containing the great eagle owl I turn on the light of a bull's-eye lantern which I have before concealed. My friend, the great owl, has by this time set up his feathers, the wings being spread out and raised all round his face, forming a large disc; his large, fierce, orange-coloured eyes, glaring from beneath his black horns, give the whole bird the appearance of a large face, beneath which my human friend believes and fancies is the body of the owl. As the light only allows him to see the face, he again exclaims *What is it?* not recognizing, under these circumstances, the well-known bird.

A fine male specimen of this species was mounted, by my son Edward, in the act of displaying a full front to a dog. It is now in the British Museum. Originally it formed part of the exhibits at the 1862 Exhibition.

THE WATER OUZEL, OR DIPPER.

(CINCLUS AQUATICUS.)

YEAR after year I had tried without success to rear from the nest these very interesting and singular birds, and notwithstanding repeated failures, I had not only persevered in the endeavour to do so, but induced others to make the attempt. In these efforts I had been aided by several friends, and among others Mr. R. J. L. Price, of Merionethshire, a Fellow of the Society. This gentleman kindly forwarded the nests of young birds, and, from time to time, by trying almost every kind of insect and other food, I succeeded for a while to rear the birds, but just when my efforts appeared likely to succeed, a change would take place and the birds would die one after another. Sometimes they would get too wet and die, apparently, of cramp; others that had been kept away from the water wasted and died of exhaustion. It was quite evident that I had not discovered a food that suited them; they had been tried with the usual food for most insect-eating birds, such as scraped beef and hard-boiled eggs, ant eggs, mealworms, spiders, flies, beetles, aquatic snails, shrimps, salmon spawn, and many other mixtures, but all failed, until my clerk and assistant, Mr. Arthur Thomson, who had taken as much interest in rearing these birds as myself, hit upon the idea of scalding the mealworms, and tried it. It was soon apparent that in this condition the mealworms could be digested, while in a raw or living state they (especially their hard skins) would pass through the birds in a hard

and undigested condition. From this moment I had but little trouble. The birds fed greedily upon the half-boiled mealworms, and I soon found them ready to leave the nest. I accordingly fitted up a cage, having the nest under a rock in one corner and a shallow pan at the other end of the cage, in which the birds soon began to dive and swim about. From the time they took to feeding themselves the food was greatly varied by introducing caddis-worms, and other aquatic insects of small size found among the weeds. This afforded them much amusement, and they threw up castings, or pellets, after the manner of raptorial birds; the pellets consisted of the parts of the insects that are not digested. It was most interesting to watch their movements, bobbing up and down, flying from place to place, and diving under water and extracting the caddis from its curious covering. I can no longer doubt the charges brought from time to time against our pets of appropriating a small portion of the young trout or salmon, for they are most expert fishers; but I feel perfectly satisfied they did not eat the roe or spawn of fish. As I have before stated, unless there is some movement, these birds do not eat anything they find.

In diving, the dipper uses its wings as though it were flying under water, and has to exert considerable force to remain under long enough to capture its food; it is so buoyant that it floats to the surface like a cork.

The song of the water ouzel is said to be louder than, but, in other respects, much resembles that of the wren. Our young birds soon gave indications of their vocal powers. I can find no very correct description of the movements of the dipper, I take, therefore, this opportunity of stating that the bird runs about rapidly, after the fashion of a starling. It jumps or hops a considerable distance, flies well, and swims like a duck.

In May 1869 I obtained my first living water ouzel. Since that time I have had a great many of these birds. Some of them I reared from the nest, and I fed them upon boiled mealworms, the larvæ of the caddis fly and other insect food; but, as soon as they were able to feed themselves and took to the water, they caught and fed upon very small fish, especially young minnows. I found them rather expensive pets, having to provide for a family of four, as they caught and devoured several dozen daily, and seemed to prefer live fish to all other food. I am not pleased to confess this, and I hope it may not cause the birds to be unmercifully killed, as I feel sure that these birds are useful, feeding, as they do, upon insects as soon as the young fish are too large for their tiny throats.

HABITS OF BIRDS.

BIRDS EJECTING THE INNER LINING OF THEIR STOMACHS —HORNBILLS—DARTER, ETC.

THERE is probably no organ in the living animal that performs so important an office as the stomach. It may therefore appear incredible that, until I called the attention of the Zoological Society to the fact that certain birds had the power of ejecting, not only the contents of their stomachs, but the inner linings of their stomachs at the same time, no one investigated the subject. When these facts were first brought to notice they were looked upon as impossibilities by some of the most able anatomists, but the proofs of the statements were of such a character that they were admitted by all who were acquainted with the subject, and I take this opportunity of calling attention to the following paper of mine read before the Zoological Society:—

"A few weeks after the wrinkled hornbill (*Buceros corrugatus*) was received in the Society's Gardens, the keeper called my attention to a queer-looking fig-like substance he had picked up in the aviary. Struck with its appearance, I took it home and endeavoured to examine it carefully, and opened its closely-folded mouth. I found this fig-like bag contained plums or grapes well packed together, the wrapper or envelope looking much like the inner lining of a gizzard, somewhat tough, elastic, and gelatinous. Almost alarmed for the safety of the bird that had thrown it up, and at the same time having some doubt as to its real nature, I at once sought the assistance of our prosector, Dr. Murie, handing him the specimen and telling him its history.

"Dr. Murie's report was as follows :—

"'On examination of the specimen, I found, as was at first suggested in joke, that the bag did absolutely consist of nothing else than the thickened semichondrified lining membrane of the gizzard. All the puckerings and indentations were more or less exactly represented, though less sharp in outline than is ordinarily the case. The mucous surface of the inner wall of the bag was slimy, otherwise perfectly identical with the same structure in a healthy bird. The surface outside, on that which might be said to be the sub-mucous tissue, was moist, comparatively uninjured, and free from any effusion or disease. The rim of the mouth of the bag was irregular and shreddy, and thinned away at its free edge.

"'The soft egg-like bodies contained within this (so to speak) cast-up sac proved to be seven or eight discoloured grapes ; or they might be, so far as appearance went, raisins. None of these had undergone the process of digestion, but from their sodden aspect, I believe had been slightly acted on by the gastric juice.

"'Positive of the nature of this queer rejected pellet, there follows the still more extraordinary circumstance that the hornbill should live and feed afterwards, seemingly not much affected by the loss of the inner coat of its stomach. Had I not myself seen and examined the objects, I would scarcely have credited the facts.'

"Having placed the specimen in what I believed to be safe custody, I kept a strict watch over my suspected hornbill, and a day or two afterwards was rewarded by a second and very perfect specimen of this extraordinary package of fruit. This I at once, after carefully examining the outside only, placed in spirits, and am now able to bring before the meeting. Since I obtained these two specimens I have seen others, all from the same individual bird ; but, as the lyre-bird and others were in the same aviary, these were mutilated and destroyed before I could save them.

"Now, notwithstanding all that has been advanced by my friend Dr. Murie, I beg leave to differ from him entirely : and instead of this most wonderful body being the result of indigestion, disease, or derangement of any kind, I have no doubt it is the natural secretion that is provided for this bird during the breeding-season, and that it is the means by which the male hornbill supplies the female bird with food during the time she

is imprisoned by him while sitting upon the eggs in the hollow tree, in which, according to the most trustworthy authorities, the male builds up the entrance to the nest with clay. Dr. Livingstone was the first person, I believe, who called attention to this singular habit in the hornbills; since then many other observers have confirmed the fact, both in Africa and India. Captain Tickell speaks of it, saying that he 'saw with his own eyes,' although he previously 'thought it was a fable.' The Rev. J. Mason, in his work on Burmah, says of the concave hornbills, 'their nests are constructed in a superior manner of clay in the stumps or hollows of old trees. After the female has laid five or six eggs, the male bird shuts her entirely in with mud except a small hole, where she can only put out her head. Here she must sit during her incubation, for if she breaks through the enclosure, her life pays the forfeit; but to compensate for the loss of freedom, her spirited mate is ever on the alert to gratify his dainty mistress, who compels him to bring all her viands unbroken, for if a fig or any fruit be injured she will not touch it.'

"This remarkable passage at once arrested my attention, for doubtless it is the result of careful observation. The point to be noticed is the fig-like appearance of the pellet of food that the male bird offers to the female, as it would be impossible, at the distance the observer must be from the birds, that he could distinguish the little yellow-skinned bag from a fig or other fruit of about that size. Mr. Wallace says the entrance of the nest is stopped up with mud and gummy substances Referring to Dr. Livingstone, I find that on p. 613, *Missionary Travels in South Africa*, he says:—'The first time I saw this bird was at Kolobeng, where I had gone to the forest for some timber. Standing by a tree, a native looked behind me and exclaimed, "There is the nest of a Korwe." I saw a slit only, about half-an-inch wide and 3 or 4 in. long, in a slight hollow of the tree. Thinking the word Korwe denoted some small animal, I waited with interest to see what he would extract; he broke the clay which surrounded the slit, put his arm into the hole, and brought out a tockus, or red-beaked hornbill, which he killed.

"'He informed me that when the female enters her nest she submits to a real confinement. The male plasters up the entrance, leaving only a narrow slit by which to feed his mate, and which exactly suits the form of his beak. The female

makes a nest of her own feathers, lays her eggs, hatches them, and remains with the young till they are fully fledged. During all this time, which is stated to be two or three months, the male continues to feed her and the young family. The prisoner generally becomes quite fat, and is esteemed a very dainty morsel by the natives, while the poor slave of a husband gets so lean that on the sudden lowering of the temperature, which sometimes happens after a fall of rain, he is benumbed, falls down, and dies.'

"It will be seen by this statement that the male dies from exhaustion, doubtless produced by the constant and continual reproducing, not only of the actual food taken by the male, but of the supply of nutritive secretion in which the same is enveloped.

"Without, however, allowing this strange statement and supposed discovery to remain simply, as many may think, an unlikely story, let us consider whether there are any other known facts bearing upon the point that will assist us in arriving at a fair decision upon this extremely interesting subject.

"That parrots, pigeons, and many other birds reproduce their partially digested food during the pairing and breeding season for the support of the female and young is well known. The tame male hornbill is particularly distinguished at all seasons by this habit of throwing up its food, which he not only offers to the female, but to the keepers and others who are known to him. The male concave hornbill (*Buceros cavatus*), now in the Gardens, will frequently throw up grapes, and, holding them in the point of the bill, thrust them into the mouth of the keeper, if he is not on the alert to prevent or avoid this distinguished mark of his kindness.

"We have now to consider the facts brought forward. In no class of animals do we find so many instances of the frequent and easy mode of casting up or reproducing the food, or the indigestible substances taken with the food, as in birds. But there is more than this to be noticed, for instance, in the esculent swallows. We know the so-called edible swallow's nest consists of a gelatinous secretion from the glands of a kind of swift; and doubtless a portion only is used to form the nest; the secretion is, in all probability, continued to feed the female and young, probably mixed with the insects captured during flight. There is also a similar secretion from

the woodpecker, but in this case it is made to assist in the capture of its food; many other instances can, no doubt, be brought forward, showing the power that birds have of ridding their stomachs of that part of their food not required for their nourishment. One very remarkable instance I well remember. A year or two ago I found in my garden, in a small heap, about a handful of the most beautiful blue pills, the size of peas, and studded all over with brilliant and shining blue fragments; I soon discovered that they were the castings of the flycatchers that had a nest immediately above the spot upon which I found them; the charming colour was due to the outer skins of the bluebottle flies upon which the birds had fed. All the insect-feeding birds throw up pellets consisting of the refuse or indigestible parts of the insects they swallow, just in the same way as the Raptorial birds (as hawks, owls, etc.) cast up the feathers, bones, hair, and food of grain-eating animals in the form known as castings or pellets.

"In conclusion, I think it may be fairly reasoned that it is much more likely that the food-pellets of the male hornbill are intended for the support of the female and young, and belong to the natural and healthy condition of the birds which produce them, than that they are the result of indigestion or disease. For we see that the power and habit of casting up from the stomach are of frequent and common occurrence among birds, and we also find that the secretions of the œsophagus are used as food for the young of many species of birds; in the parrots and pigeons I think this is universal.

"Another strong argument in favour of my belief is to be found in Dr. Livingstone's statement that 'the male bird, by his constant attention upon the female, becomes so prostrate and exhausted that a slight change in the temperature causes him to fall down and die.'

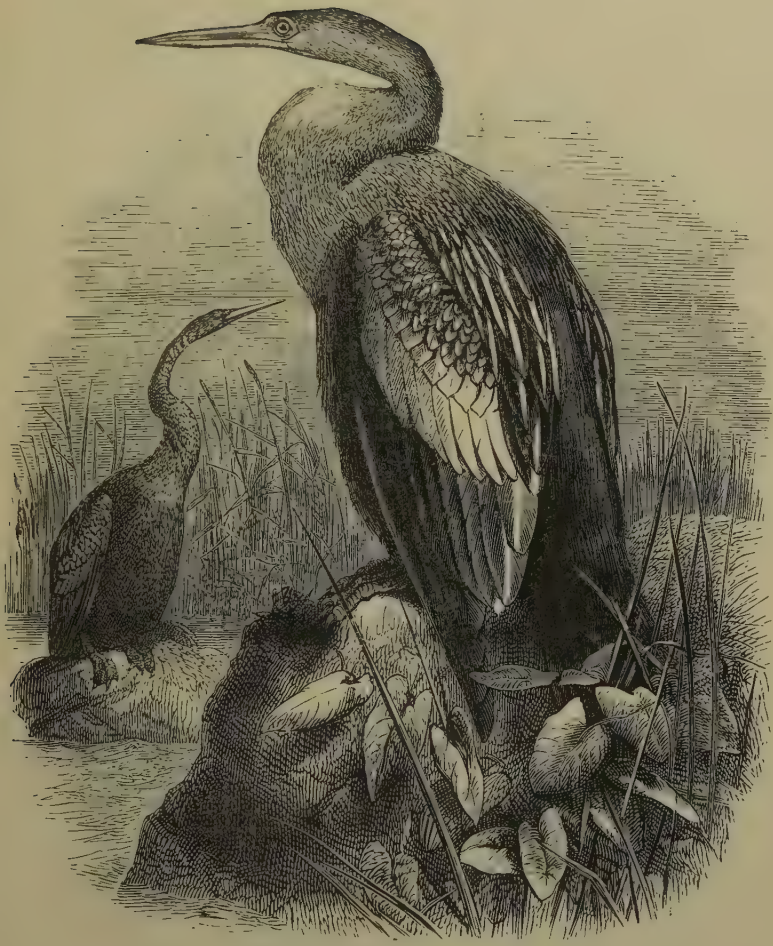
"It cannot be supposed that the mere collecting food for the female is the cause of this fatality, it is doubtless the overtaxing of the system by the constant secretion of this nutritive matter, reminding one of the blood in the nests of the esculent swifts after the birds have been robbed of the first and second nests. But the most positive proof of finding this package of food is given, without, however, understanding its use, in the extract from the Rev. T. Phillips' MS. before referred to."

Having once established the fact, all that is required is

attentive watching for the purpose of detecting and ascertaining in what other animals this habit may be found. The result of close observation has brought to light the same habit in two species of birds belonging to a family far removed from the *Bucerotidæ* or hornbills, viz. in the darter (*Plotus anhinga*) and the Brazilian cormorant (*Phalacocorax brasilianus*). I first found the ejected stomach-lining from the darter, and in a short paper read at the meeting of the Zoological Society, February 1, 1881, I communicated the fact. The cast epithelial lining of the stomach was exhibited and described by the prosector of the Society, Mr. Forbes. In my notice I called the attention of other observers to this singular discovery, as I suspected the same might be met with in many other birds. I since find the cormorants have the same habit and power.

REMARKS UPON THE HABITS OF THE DARTER. (*PLOTUS ANHINGA.*)

At a meeting of this Society, 1867 (see *Proceedings of the Zoological Society*, 1867, p. 142), I read a paper upon habits of the hornbill, and called attention to the fact that, from time to time, these birds cast up a substance that is found, upon examination, to be the epithelial lining of the gizzard. I now bring before the Society's notice another instance of this remarkable habit, in a very different group of birds. A darter (*Plotus anhinga*), the bird I now speak of, was received on July 18, 1880 and since that time has appeared to be in *perfect health*, and has fed regularly. It has thrown up the lining of its stomach on three or four occasions during this period; but unfortunately the keeper, not being aware of



DARTER, OR SNAKE-BIRD.

the interest that would be attached to the circumstance and not knowing the nature of the substance, carelessly threw the castings away. I happened, however, to be present when the last sac was thrown up, and secured it for examination, and have handed it over to our prosector Mr. Forbes, for that purpose.

This remarkable fact being now known to occur in two widely separate genera of birds, induces me to believe that the habit may exist in many other birds, but it has hitherto been unobserved. In many cases the substance would sink to the bottom of the water, where it would soon decompose, and this may account for its not having been previously noticed.

I feel particularly anxious to call the attention of persons keeping cormorants, and of those persons visiting the haunts of cormorants, to this habit, as it is highly probable that this bird does the same thing.—(From the *Proceedings of the Zoological Society*, 1881.)

HORNBILLS.

Living examples of these remarkable birds (the concave-casqued hornbills, *Buceros bicornis*) were perhaps never before 1881 brought to Europe in the adult state. They are natives of the Indian islands, and some of the large species are confined to Sumatra, Borneo, Malacca and Africa. Some of these strange-looking, heavy, and clumsy birds feed, principally, on fruit of various kinds, while others occasionally catch insects, small birds, reptiles and mammals. The voice in most of the species is loud and most discordant, the flight is heavy and laboured, and the noise produced by the wings while in the air can be heard at a great distance. Although possessed of enormous bills, these great birds are, in confinement, extremely gentle, and become very tame and attached to those who feed and caress them.

HORNBILL STORY.

One of the funny things that are from time to time told to me, was related by Captain van Diependre of the s.s. *Baron Osy*. At the animal sale at Antwerp, Jamrach bought a large ground hornbill, which the captain brought to London for him; on its arrival, Jamrach looked into the basket containing the bird, and exclaimed, "My Got, the birt haf lost his pill," and sure enough the lower mandible was gone. Upon referring to the captain he recollected

having found a queer-shaped piece of wood which he had put on one side before leaving Antwerp, and upon examination he at once saw that the bird had lost the artificial lower jaw that had been made for him by his former master at Bordeaux, at which place the bird had been kept for a long time. This lower jaw had been fastened on by two small hooks and studs. Having got loose during the journey to the ship it dropped off, and as the poor bird could not pick up his food without the under jaw, Jamrach was obliged to feed it by hand until Captain van Diependre made another voyage to Antwerp, and brought back the lower jaw of this unlucky half-billed hornbill.

IGNORANCE OF NATURAL HISTORY.

CRUELTY TO PARROTS.

Alfred Swan, manager to Mr. Cross, a dealer in birds and beasts, of Earl Street, Liverpool, was summoned in October 1869 by William Henry Saunders, an inspector of the Royal Society for the Prevention of Cruelty to Animals, for torturing and ill-using six parrots. Inspector Saunders was upon the platform of the Herne Hill Station, when his attention was drawn to a small box which had recently arrived by train from Liverpool. He found the box to contain six live parrots. Through a crevice in the box he saw that the birds were in a distressed condition and trampling upon one another. He felt it was his duty to get another box, and did so, and the birds were transferred to that and water supplied to them. He found the birds were much distressed, three that had been trampled upon being in a most exhausted condition. The birds, after receiving the water, ceased their cries, which had evidently been those of distress. Upon the box was a ticket bearing the words, "Perishable, live birds." Both Mr. Cross and defendant denied there was any cruelty, and declared it was necessary to send parrots not in a large box so that they could do one another injury on the way. Counsel submitted several objections to the summons, and urged that if any offence had been committed it was not in the jurisdiction of this court, but at Liverpool. He also questioned whether parrots came

within the definition "domestic," so as to be dealt with under the Act. The magistrate said he should not decide against the defendant as to the size of the box, but on the question that they had not been supplied with water from the time they were packed, and their cries showed they were suffering from want of water. Counsel said birds of this description needed but little water. The magistrate said it would require strong evidence to make him believe that birds could be sent such a distance without water. It was not a case for a heavy penalty, but he should convict in order that attention might be called to the proceedings, and he would readily grant a case to the superior court if asked for. He merely, therefore, ordered the defendant to pay ten shillings and two shillings costs only.

On this case I published at the time the following comments:—

Having during the last thirty years kept many hundreds of parrots under my charge, I can say most positively *that parrots do not require water*. Many species die in consequence of drinking water. Thousands of the small Australian parrots are brought alive and in the most perfect health and condition from Australia to London, the food consisting of dry canary-seed alone. It has been found that the birds become sick and die on the voyage if supplied with water. The valuable collection of parrots in the Zoological Gardens of London (the finest in the world) is kept *without water*. The charge of cruelty, therefore, in the case of Cross was unfounded.

This, however, is not the only wrong inflicted, the conviction was illegal; the law, or Act of Parliament, was passed for the prevention of cruelty to domestic animals. Parrots are not domestic animals. The parrots sent by Cross are all wild caught birds, and mere tameness cannot

be construed into domestication, otherwise a tame lion or tiger must be considered a domestic animal.

It may be as well, for general information, to endeavour to explain the meaning of the term domestic or domesticated. Domestic animals are those that have become subject to man, and are bred and reared for the purposes of food, for their usefulness, or as pets. There are some few animals that may be considered semi-domesticated, that is, half reclaimed from the wild state. The following list will probably include nearly the whole of the animals that can fairly be considered as domesticated, viz.:—Horse, ass, mule, dog, cat, pig, camel, llama, alpaca, ox, rabbit, sheep, goat, guinea-pig, common goose and Chinese goose, common duck and Muscovy duck, fowl, turkey, pigeon, canary. Semi or half-domesticated:—Red deer, fallow deer, pea-fowl, Guinea-fowl, pheasant, swan.

All the species that are quite domesticated exhibit very great difference among them; in fact, the variation in most of them would cause, and has caused, many persons to think and regard them as distinct species, instead of varieties of the same species. Take, for instance, the dog. The little pug or King Charles spaniel could hardly be expected to be the same species as a large greyhound or mastiff, yet such is undoubtedly the case.

Had the names of the animals that the Act of Parliament was intended to protect been inserted in the Act, it would have saved a considerable amount of misunderstanding. If, in consequence of a few blundering mistakes and convictions, the law is made to apply to wild animals, no sportsman, whether he be a fisherman, huntsman, or gunner, will be free to pursue game, for to wound fish, flesh, or fowl is cruel, and sporting of all kinds must consequently be put down.

TREATMENT OF PARROTS.

One of the commonest and most frequent maladies that we meet with in parrots is the loss of the feathers. No doubt, in many instances, this is the result of skin disease, produced by artificial feeding and want of exercise, to which something more may be added, viz. the want of occupation. It must be borne in mind that we have in the parrot a very highly-organized and intelligent creature to deal with. A bird that listens with such attentive watchfulness to every sound and imitates to so great a nicety that which it hears, with a memory which retains those sounds and which it repeats for years afterwards, must have also a tendency to acquire a habit of amusing itself, which it does in a very unpleasant way as regards its own appearance. It is quite certain that the bird may be perfectly healthy, and in good condition in every respect except in its plumage, of which to such an extent will some parrots denude themselves, that the only vestige of feathers to be found upon them is on their heads, which may be in the most perfect and beautiful condition, simply because they are beyond the reach of his bill. If the supposed disease of the skin prevents the feathers growing on the body of the bird, would not this same disease extend to the skin of the head? Long experience has shown the writer that the want of amusement, proper food, and exercise produce these unpleasant and unsightly conditions. It may be reasonably supposed that want of proper food and exercise would be productive of diseases, and in many cases it is so, but more generally the want of amusement is the chief cause of a bird biting off his feathers. May not the habit, in the human species, of biting the finger-nails be brought on through the want of employment, and not considered as

a skin disease? It may at times arise from a peculiar temperament, and be quite beyond the skill of the doctor to advise or find a remedy, as it is done almost without the knowledge of the individual who has acquired the habit, which appears analogous, if not quite identical, with that of feather biting. There is no doubt that some of these nail-biters, after they have nibbled to the quick their nails, would, had they feathers, soon reduce them to stumps.

Treatment.—The old Story, what to Eat, Drink, and Avoid.—Feed the birds that bite their feathers upon canary-seed and water, which afford good and wholesome diet. As each seed requires to be shelled it occupies a considerable part of the day to obtain a sufficient supply of food; thus amusement, in part, is given, but in the case of the bird being unused to this seed care must be taken not suddenly to change its usual food, otherwise the risk may be run of half-starving a pet bird. Avoid hemp-seed, meat, fat, bones, and all kinds of food likely to produce irritation; in warm weather let the bird be well syringed with cold water every day, a common garden syringe being used. This operation must, however, be performed with judgment and caution; the bird must not be suddenly exposed to it, care and a daily increase being necessary, otherwise a fatal result may ensue; a slight sprinkle being given on the first day or two. Caution must be taken not to expose the bird in a cold or draughty place after the bath, and let it dry itself in the sun. The bath should never be given after the middle of the day, and on no account in cold or wet weather; the bird left in the open air during a warm shower of rain would be the best bath it could have. This treatment, with the cooling food, canary-seed and water, is the best and most successful one yet met with in preventing and curing the habit

of destroying the feather in parrots. There is a great variety of food generally given to parrots, and most of them thrive and do well upon hemp and canary-seed, boiled Indian corn, scalded bread or biscuit, fruit, nuts, and vegetable substances; sometimes (but rarely) a little raw meat (not fat) is good for them.

CRUELTY TO ANIMALS.

THE FALLACY OF THE SUPPOSED BLINDING OF BIRDS.

One of the oldest fallacies is the notion that in order to induce a wild caught bird to sing, it was a practice of the cruel bird-fanciers to put out the eyes of the birds with red-hot needles.

Under these circumstances I deny that any wild caught bird, say the nightingale or robin, would live after such a cruel operation.

It is sometimes difficult to induce these birds when first captured to take food, and if deprived of their sight it is positively certain they would be starved to death. I have no doubt the origin of the story is traceable to an old book translated from the German describing the treatment of fresh-caught nightingales. The book to which I refer must have been published more than a hundred years ago. In it is given a description of the caging of nightingales. When newly caught they are put singly into a square cage of about 10 in., with wire front only; over the wire front is fixed a thin white blind to prevent the bird being alarmed on seeing any one moving about.

In the translation referred to was the odd statement that when the bird was put into the cage he must be

blind; the true meaning being, that the white blind should be affixed to the cage.

This statement, in all probability, would be misunderstood, and without doubt led to the supposition that it was necessary to blind the bird instead of the cage.

In answer to a letter which is not dated I said:—

"No one can be more delighted than I am at the efforts of so many to prevent the cruelty that was and is still inflicted upon the lower animals.

"At the same time I cannot help expressing the disgust I feel upon reading some of the statements that are from time to time put forward, perhaps for a good purpose, but the effect is painful and the statements untrue. The putting out of the eyes of small birds with red-hot needles is one of these horrible falsities.

"I have been acquainted all my life with most of the bird-catchers and bird-fanciers in England, and I can say, without fear of contradiction, that no such practice does, or ever did, exist, and that birds thus treated would die. It is entirely a false and cruel invention of writers whom I shall call Shudder-mongers."

PELICANS.

PROBABLE ORIGIN OF THE OLD STORY OF THE PELICAN IN THE WILDERNESS FEEDING ITS YOUNG ON ITS OWN BLOOD.

HAVING devoted much attention to investigations upon the subject of the supply of food provided by several species of birds for their young, I have collected many interesting facts showing that, in some instances, the parents prepare by partial digestion, and, in others, by the addition of a secreted nutritive substance, the food intended for the support of their offspring. The incident which I am about to relate I was certainly not prepared to expect, nevertheless, such facts as I now state have caused me little astonishment, as they appear to me to afford a solution to the well-known and ancient story of the Pelican in the Wilderness. I have heard that the so-called fable originated, or is to be found, on some of the early Egyptian monuments (I do not know where), but that the representations are more like flamingoes than pelicans. A pair of flamingoes in the Gardens frequently showed signs of breeding, and were supplied with heaps of sand to form their nests, but without result; nevertheless they appeared to take considerable notice of a pair of cariamas in the same aviary. These latter birds had a habit of bending back their heads, and, with open gaping mouths, uttered loud and somewhat distressing sounds. This habit at once attracted the flamingoes, and very frequently one of them advances towards the cariamas, and, standing erect over the bird, by a slight up-and-down movement of the head,

raises up into its mouth a considerable quantity of red-coloured fluid; as soon as the upper part of the throat and mouth became filled it dropped or ran down from the corners of the flamingo's mouth, the flamingo then bent its long neck over the gaping cariama and poured this fluid into the mouth, and, frequently, on the back of the cariama. Having seen this done repeatedly, I took an opportunity of obtaining a portion of the fluid and submitted it to Dr. Murie for examination We placed it under the microscope and found it composed of little else than blood, in fact the red blood-corpuscles are wonderfully abundant in the otherwise clear and almost transparent glutinous fluid. That this did not proceed from any disease of, or injury done to, the flamingo, nor arise from, nor is produced by, any portion or part of the food taken by it, I am perfectly certain, because the bird is in the most vigorous health and condition; but I believe that it was an attempt to supply food to the cariamas, just as the hedge-sparrow and other birds supply food to the young cuckoo, and I have no doubt if a careful observer had the opportunity of watching the flamingoes on their breeding-ground, he would find that this is the mode of feeding their young; no doubt other food is also provided, but most likely mixed with this secretion. I think it highly probable that this habit was noticed in ancient Egypt, and, by the confusion of names in translation, the pelican was supposed to be the bird intended: in fact, I have heard that the representation (which I am very anxious to see) is much more like a flamingo than a pelican. Again, a flamingo is much more a bird of the wilderness than the pelican, seeing that the pelican requires a good supply of fish, while the flamingo can live and does well upon very small insects, seeds, and little fry, and is found in places in which the pelican would starve.

WONDERFUL FEATHERS.

£100 FOR A FEATHER.

FROM time to time very strange stories and extraordinary adventures are related to me by the many travellers and others with whom I come in contact, some of them bringing from abroad wild beasts, birds, or reptiles, and to add to the value of the interest of their specimens a long yarn is frequently spun. I have always been very careful, I may say guarded, in offering an opinion, even when I felt that I could not agree with the narrator, not wishing to have a disagreeable controversy, especially with a stranger.

It happened, however, that one day I met some American gentlemen, among whom was one who had been travelling in Japan, and who talked loudly about the fowls he had obtained in that country, with feathers in their tails that measured 17 ft. in length. This statement appeared to me so incredible that I felt disposed not to let it pass without making some remark. Not wishing to hurt his feelings by throwing any doubt upon his statement, I said, "I have collected feathers for many years, and have some of the most beautiful as well as many large and long ones, but none approaching 17 ft. in length. If I could procure a feather of that length, I should be quite willing to give one hundred pounds for it." His friends looked at him with some degree of astonishment, and at the same time asked me if I

were in earnest. My Yankee was not behind in undertaking to supply me forthwith, but, I remarked, that upon the production of the feather, it must stand the test of being drawn through a tub of warm water.[1] This my friend did not object to, but after the lapse of four or five years my hope of being the possessor of a seventeen-foot feather has been blighted, and, I fear, never to be realized.

[1] Many feathers are fastened together so skilfully, that without the test I proposed it is almost impossible to detect the join.

VOCAL SOUNDS OF BIRDS.

Apteryx	Bill-snappers
Bell-birds ...	Distant bells
Bitterns	Booming
Blackbirds ...	Mimic crowing, besides their wild native notes
Bulbuls	Babbling
Bullfinch	Piping
Cariama	Screaming
Cassowary ...	Bellowing and distant thunder
Cat-birds	Mocking
Chatterers ...	Chattering
Crake, Corn ...	Craking
Cranes	Shouting
Cuckoo	Cuckooing—"coo-koo"
Curlew	Whistling—"wheep-wheep"—"corlieu," or "courlou"
Dhial-bird ...	Warbles, and mimics
Doves	Cooing
Ducks	Whistling
„ Drakes ...	Wheezing
„ Ducks ...	Quacking
Emu	Drumming
Falcons	Chaunting
Finches	Singing
Fowls, domestic cocks	Crowing
„ „ hens	Cackling
Geese	Hissing
Gull, Great black-backed	Haw-hawing
Hawks	Screeching
Kingfishers ...	Laughing
Mynah	Talking, besides their musical call-notes

Nightingale ...	Rattles, melodious rattle of voice
Ostrich	Roaring
Owls	Hooting and bill-snappers
Parrots	Talking
Piping Crows ...	Musical piping
Prairie Grouse ...	Quooking
Rails	Squeaking
Ravens	Cawing
Shrikes	Shrieking
Sparrows	Chirping
Storks	Bill-rattlers
Swans	Whooping
Titmouse	Tittering
Turkey	Gobbling
Warblers	Warbling

MARKINGS OF ANIMALS.

In the feline animals the colour and markings are in all probability designed for a purpose, and that purpose is no doubt to afford these animals a means of concealment. The stripes and markings of the tiger when lurking in the long dried grass and reeds so assimilate to the surroundings that it becomes somewhat difficult to see him, hence his ability to creep stealthily and unnoticed upon his prey. The same may be said of the adult lion, whose sandy colour enables him to remain unobserved in the sandy desert where he is usually found.

With regard to the jaguar and leopard, who frequently hide themselves in trees, their spots and markings are in keeping with the adjacent foliage. It is well known that some of the smaller animals, such as hares, Arctic foxes, and ptarmigan, assume a change of colour according to the season and the locality in which they are found. The common hare which is met with on light sandy soil is distinguishable from the hare found upon dark heavy land. Among fish and reptiles, the colour frequently assumed by them is found to assimilate to the locality in which they may temporarily exist.

Many interesting experiments have been tried upon insects. Wood, Wallace, and other naturalists have shown that the colour of the chrysalis of many of the butterflies will vary according to the situation where found. The assumed tint is a protection against their enemies, and

the mimicry at it practised by these creatures is most wonderful. Now with regard to coloured natives of all nations in their wild haunts, they can move about in forest or jungle without being seen by a European, whose eyes are not trained for that purpose, the colour of their skins being a disguise for self-defence.

The young of the tiger is striped like the adult, but of course less distinctly. The young leopard also resembles the adult in its markings. The spots, stripes, or markings are always present in the young of those species of the genus *Felis* both large and small that are so marked in the adult state.

As far as my knowledge extends, the young of all other animals (except the domestic cat) exhibits traces of spots or other markings, although they disappear in the adult animals.

THE MIMICRY AND DECEPTION OBSERVED AMONG THE LOWER ANIMALS.

At the evening meeting of the Zoological Society, November 15, 1870, Dr. Murie read a paper upon the "Anatomy of the Manatee," and pointed out its remarkable form and its resemblance to other aquatic mammalia; in some respects it is after the fashion of the porpoise. In calling attention to this subject, it may be said that the porpoise is a sham fish, or only a disguised mammal, having assumed the form and general colouring of a fish, and thus disguised he is enabled to swim and pass his time among the finny tribes, preying upon them with impunity. This is doubtless the fact, for no other form is better adapted to answer the purpose of the rapid motion required to capture the active and swift-swimming fishes upon which the porpoise is destined to live. We have an indication of the fish-like form in the otters and seals, and in some of the latter the arrangement of the colour, the dark back and white belly; but in the porpoise we have the external resemblance to the fish most complete, even to the dorsal fin.

Much has been written upon the subject of mimicry. Mr. Alfred Wallace, Mr. Bates, and others have called attention to the close resemblance of insects to *leaves*, *sticks*, and other inanimate and animate things; of one family of birds appearing to belong to another family; and

some of the writers have gone so far as to express a belief that this resemblance has been effected by the will and design of the creatures themselves: for instance, that a caterpillar can select for its hiding-place a spot upon which it assumes the cocoon state and assumes the colour of the surrounding object as a means of concealment; much in the same way as the chameleon or many other reptiles and fishes. How far this may be the case remains to be considered; but an equally remarkable resemblance may be found in organisms far below the vertebrate or invertebrate animal kingdom. In walking through the woods in Surrey or Sussex in the month of September, when the surface of the ground is covered with the clean-washed flints, it is difficult and almost impossible to distinguish the flints from a fungus that crops up among them, varied in form and presenting a whitish surface, and not only looking like a flint in its perfect state, but when broken up you may observe not only the thin white coating like the flint, but the black or dark-coloured inside, so closely resembling a flint in all but the hardness that one could not help calling to mind the remarks of others upon the so-called mimicry of one natural object to another.

These resemblances are found abundantly in vertebrate animals, but among the lower forms they are endless. Many of the species of *Polyzoa*, for instance, assume the form and colour of sea-weed, moss, or corals. Again, among *Orthoptera*, we find in the family *Phasmidæ*, or stick insects, such wonderful likenesses to dry bits of stick, as almost pass belief, and are only equalled by the family of leaf insects, of which *Phyllium scythe* is a good example, not only in colour but form, which together with the veins and branching of the leaf are most singularly represented. In other instances, among insects we find the caterpillars of the family *Geometridæ* so closely imitating a part of the

branch upon which they live, that it requires very close inspection to detect them. In butterflies and moths especially, the colour and form is so frequent a resemblance to the object upon which they rest, that only expert and trained eyes can see them; persons unaccustomed to their appearance and remarkable mode of concealment are unable frequently to see them even when pointed out by the practised and skilful collector.

Large crocodiles and alligators lying on the banks of rivers look like fallen trees on the rough surface of the muddy bank; the chameleon and other reptiles have the power of assuming the colour of the branches and leaves upon which they rest, and thus escape notice. Many creatures select for hiding-places such as assimilate to their own colours, and with watchful eyes remain quiet, and thus remain unobserved. The striped tiger in the reedy jungle is not easily seen through the dead and dry reeds and long grass, the dark stems of which singularly hide and mingle with the dark stripes of the animal; as difficult also is it to see the lion upon the sandy rocky ground, which it resembles in colour, as much as the ptarmigan in its white winter dress resembles the snow-clad mountain where it hides. All sportsmen know how slight a hollow in the ground, or how small a bunch of weed or twig, will serve to screen from sight a hare or other animal. The skill or cunning, as it is called, employed to escape detection by many animals would afford an inexhaustible subject. A bird of dark colour will stand in the shadow of a tree or other object, or squat upon the ground by a clump of earth less than itself, and yet appear to be part of it.

All these are striking instances of the means of escape from foes, or to enable the creatures to live; for the remarkable part of these deceptions (if they may be so called)

consists not only in appearance, but they are carried out by actions as unmistakable as they often prove successful. For instance, those who have witnessed the performance of the female of the peewit, and many other birds, to allure you from the nest will call to mind the cunning artifice so skilfully played. Of this a good example may be found as applied to the ostrich in Andersson's *Lake Ngami*, p. 254, plate 7.

Many insects and reptiles feign death, and well-recorded instances are not wanting in this deception succeeding in the higher animals. One of the means of escape adopted, and urgently recommended in Sweden for the safety of the hunter, should he fall into the power of a bear, is to hold his breath and feign death. Wild caught birds, such as goldfinches, linnets, and the like, when taken out of the trap and handled for a short time, will remain perfectly quiet and may be laid on their backs in the palm of the hand; and while watched, remain motionless; but no sooner do they find they are unobserved, than they will fly off.

Sometimes the most helpless and inoffensive creature in fear will assume an aggressive and angry expression, and one of the most ludicrous sights is to behold a common lobster immediately after casting his shell; his soft and swollen body and limbs are in great danger should he meet one of his own species in a perfect and hungry condition. When this happens he raises his large claws and makes sundry darts and starts towards his adversary, in the hope of driving him away. It not unfrequently happens, however, that his efforts are unavailing, and his opponent closes upon our soft and watery friend, and makes a hearty meal off his tender and juicy limbs.

Reference was made above to the observations of Mr. Alfred R. Wallace, and the following extract from his

contributions to the *Theory of Natural Selection* may be taken as a good illustration of this part of the subject. At p. 61 he says:—"I myself had the good fortune to observe scores of *Kallima parelekta* in Sumatra, and to capture many of them, and can vouch for the accuracy of the following details:—These butterflies frequent dry forests, and fly very swiftly. They were never seen to settle on a flower or a green leaf, but were many times lost sight of in a bush or tree of dead leaves. On such occasions they were generally searched for in vain, for while gazing intently at the very spot where one had disappeared, it would often suddenly dart out, and again vanish twenty or fifty yards further on. On one or two occasions the insect was detected reposing, and it could then be seen how completely it assimilates itself to the surrounding leaves. It sits on a nearly upright twig, the wings fitting closely back to back, concealing the antennæ and head, which are drawn up between their bases. The little tails of the hind wing touch the branch and form a perfect stalk to the leaf, which is supported in its place by the claws of the middle pair of feet, which are slender and inconspicuous. The irregular outline of the wings gives exactly the perspective effect of a shrivelled leaf. We thus have size, colour, form, markings, and habits, all combining together to produce a disguise which may be said to be absolutely perfect; and the protection which it affords is sufficiently indicated by the abundance of the individuals that possess it."

Another careful and trustworthy observer of nature, and one who, as an artist, lent his valuable aid by the very faithful representations published in the *Student*, September 1868, illustrating his observations upon "Insects in Disguise," remarks at p. 83:—"The chrysalides of butterflies possess a most astonishing means of eluding

observation, their shells being photographically sensitive for a short time after the caterpillars' skins have been shed, so that each individual assumes the colour most prevalent in its immediate vicinity; this interesting fact not being generally known, I last year reared caterpillars of swallow-tail and white butterflies for the purpose of obtaining chrysalides for exhibition at a meeting of the Entomological Society. The mode of procedure was suggested by me in *Recreative Science* for July 1860, p. 35, and is simply as follows:—'Caterpillars were obtained and reared on their proper food-plants, and when full-fed were placed in boxes, the insides of which had been coated with colours of different kinds; as soon as they had fixed themselves, the boxes were opened and exposed to sunlight in a window. The most successful specimens of colouring in the chrysalides were obtained when the changes took place on bright days, and when the individuals were surrounded by a quantity of the same colour as that on which they were placed. Under these conditions, the markings peculiar to the species were greatly overpowered when necessary to the assimilation of colour; they were, in fact, completely overpowered, and replaced by bright green in chrysalides of the swallow-tail (*Papilio machaon*) and white butterflies now in my possession. I also exhibited a great number of chrysalides of the two common species of white butterflies taken from the stone-coloured sides of a house. Against one of the sides a grape-vine was trained, and here the chrysalides of both species were green, being affected by the light shining through the leaves. On the bare side of the house not a single green specimen could be found, and a glance at them conveys an accurate idea of the colour of the surface to which they have attached. As caterpillars are evidently unaffected by colour in their choice of a

resting-place on which to undergo their transformations, it follows that this photographic power in chrysalides is most important as tending greatly to make them invisible during their period of exposure in a condition of utter helplessness, which consists of from a few weeks to half-a-year, and in some exceptional cases of more than a year. The gilded chrysalides of *Vanessidæ* and other genera are extremely beautiful, and my opinion of their gilding being a protection against birds has been confirmed by Mr. Jenner Weir, who says that birds will not touch them, evidently mistaking these chrysalides for pieces of metal. I have noticed particularly that the chrysalis of the small tortoiseshell (*Vanessa urticæ*) is golden only when found among nettles, for when on walls, palings, tree-trunks, etc., it invariably partakes of their colours and general appearance of surface. The same remark may be made with regard to the chrysalis of the large tortoiseshell (*Vanessa polychloras*), which, when found amongst leaves, is of the colour of a withered elm leaf, with a few silver spots; when, however, on walls, etc., the whole colouring is different, and the silver spots are absent. Now, it would be no advantage to these chrysalides to assume the green colour of the leaves, for they hang quite loosely by the tail, with no band of silk to keep them close to their surface of attachment, and the green colour would only make them like tempting morsels to birds, etc. It is, however, very remarkable that chrysalides belonging to this genus are affected by green leaves so differently from those of the generæ *Papilio*, and *Pieris;* the chrysalis of the orange-tip, so remarkably lengthened in form, appears to resemble the seed-pod of a cruciferous plant; that of *Papilio podalirius* is coloured, ribbed, and veined like a dead leaf.'"

The undoubted fact of these creatures appearing to be

what they are not, and as the instances above mentioned tend to show that they possess so great a power of assimilating, it is well worthy of our most careful consideration and investigation, in order to determine and ascertain if the possibility exists of elucidating this remarkable phenomenon.

CUCKOO.

The statement in the *Times* of December 11, 1888, that a cuckoo was heard but not seen, reminded me that a few years before a country boy employed in the Gardens amused himself by climbing one of the large trees, where he was completely concealed, and he so closely imitated the voice of the cuckoo, that I, as well as many of the visitors, was for some time most perfectly deceived. This was at the time of the year when the cuckoo is usually in full song. I have no doubt that if my young friend were in the country in the depth of the winter, and were to exert his vocal organs in imitation of the well-known bird, we should have more letters corroborating the letter in the *Times* to which I have referred.

A very remarkable occurrence once happened in the Gardens. A young cuckoo taken at Oxford was presented to the Society. To my great astonishment I found that a pair of hedge-sparrows had taken upon themselves the task of feeding this greedy young bird, whose open mouth and craving voice and insatiable appetite so completely occupied these two little birds that they entirely neglected their own nest and young to satisfy the wants of the stranger. I can only account for it by supposing that the hedge-sparrows and other insectivorous birds are imposed upon by the distressing note and the expression of hunger exhibited by the young cuckoo's gaping mouth. If there is such a thing as fascination I think this a very good instance of it.

PRESERVATION OF SMALL BIRDS.

In my opinion we should commit a great blunder in the too careful preservation of those kinds that would soon become a nuisance, and cause a very grievous loss in consequence of the depredations they commit. Among the foremost of these I may mention the common house-sparrow; he is a bold, cunning, and determined thief, and for many years past every endeavour has been made in the Gardens to reduce their numbers, not only by shooting, netting, and otherwise catching the old birds, but by taking their young and using them as food for the more rare birds and animals. Yet, notwithstanding the united efforts of every keeper here, they are quite as numerous as ever, and had not those constant efforts to keep them down been resorted to, it would be quite impossible to keep (unless in sparrow-proof cages) any other grain or seed-eating birds or animals. They would so consume the food that other birds and animals less bold than themselves would be starved by them.

We have had, however, some slight return for the great damage they do, by feeding the small hawks, owls, and animals on their dead bodies, and so regular has this supply become that it is depended on for the purpose, and renders their destruction of value, not only in keeping their increase in check, but as supplying a very necessary and delicate food for rare and interesting animals, that

could not be kept on coarse flesh. I could mention many other vexatious losses and injuries inflicted by this wily depredator.

How much property is annually destroyed in London and other large towns by the overflow of rain-water pipes caused by these troublesome pests who so frequently build their nests in the head of the water-pipes on the upper part of the house, it is impossible to say. The first heavy storm that comes overflows the gutters, the houses and furniture being consequently damaged with water.

To carriage-builders (especially those engaged in railway-carriage building) they are a great source of annoyance. The doors and windows of the large painting-sheds are open for the purpose of admitting light and air; the sparrows enter, fly about among the rafters, etc., and, by their droppings and the filth they bring, destroy the work of the carriage-painter; the mass of filth, etc., falling upon the wet paint or varnish is most ruinous.

Hundreds of instances of this kind could be noted to show how very unwise it would be to have a law to prevent their destruction even for a single day in the year. There are no hawks or animals in or about London to keep them down, cats are not about during the day, and consequently if their numbers were not to some extent kept in check they would soon become in many places a very serious annoyance and loss.

NOTES ON SCENT.

The sense of smell in many animals almost surpasses belief. The development of the nasal organ in the elephant is probably greater than in any other mammal. In passing through the jungle it is a very common occurrence for the elephant to pick up even small articles that have been used by man, and hand them to the mahout. It is quite impossible, in many instances, that these articles could have been seen by the animals. The remarkable fact is that these beasts do not pick up, indiscriminately, any generally common every-day substances.

The faculty of following the footsteps of men or other animals by scenting over the ground that has been traversed, although many hours may have passed before the animal came upon the track, is possessed by many of the varieties of the dog.

Ruminants, such as many of the deer and antelope species, scent a man or a dog at very long distances, hence the sportsman endeavours to get to the windward of the animal he wishes to stalk. There is, so far as I know, only one peculiar power that I believe man possesses more acutely than any animal, and that is his quick discernment of burning; no matter whether the substance on fire be animal or vegetable, the human being detects it, and at once is anxious to know its whereabouts. I don't know any animal which appears to notice any sense of burning or takes any trouble about it except man. The only reason I can assign for this dread of fire in the human race, is, that to man it is one of the most important things known contributing to his existence, and one when not under his control that may lead to his destruction.

FOOD OF VARIOUS ANIMALS AND BIRDS.

MONKEYS.

In feeding the various kinds of monkeys it will be found that the more varied the food, and the more often changed, the better they thrive. Many of the Old World monkeys live much on fruit, leaves, tender branches, and buds of flowers. The ourang, chimpanzee, *Hylobates*, gibbons, *Semnopithecus*, and *Colobus* group are less insectivorous and carnivorous than most of the others.

Most of these will, especially during the winter, improve by the addition to their food of a little animal substance.

I have found the following mode of feeding answer admirably for a large number of the common species:—

Mix boiled rice, pea-flour, scalded bread, boiled carrot and potatoes, a little sugar, and some raw or boiled meat ground fine in a sausage-machine. Mix the above into a stiff pudding, break off in lumps as big as walnuts, and let each monkey be fed two or three times a day. Give them bread-and-milk now and then for a change; nuts, biscuit, dry bread, wheat, peas dry; Indian corn, dry or boiled, fruit; green leaves of many different kinds.

Always take care that the fruit and green food be fresh and good. See also that the animals are not relaxed by the food being too moist.

The New World monkeys feed more upon insects and small animals. Many of them are excessively fond of

young birds or the eggs of birds. I therefore advise a greater supply of insects, such as mealworms, spiders, beetles, small birds, mice or flesh mixed, as before recommended for the other monkeys.

LEMURS.

The food of the *Lemuridæ* consists principally of fruit, leaves, flowers, and probably large caterpillars and other insects. I much doubt their feeding upon birds or mammals. In captivity they thrive on bread-and-milk, boiled rice, fruit, vegetables, etc., etc. The fruit may be bananas, grapes, apples, pears, or any other ripe fruit in season; nuts of various kinds, figs, raisins, dates, etc. Vegetables such as cabbage, lettuce, potatoes (boiled), carrots (raw or boiled), yams, etc., etc.

GALAGO.

These animals are far more fond of animal substances than the true lemurs. In the galago we have a nocturnal habit, and they feed at night freely on young or small birds, mice, lizards, insects of all kinds, such as caterpillars, mealworms, beetles, spiders, flies, together with fruit and sweet food of almost any description. They like to catch and kill their prey, and are wonderfully active when allowed sufficient space to jump about.

In captivity their principal food consists of bread-and-milk with honey, boiled rice, etc., etc., cooked or raw meat; in fact, they eat almost anything that comes to table.

THE LORIS AND POTTO.

Feed much the same way as the galagoes; but are not active and quick in their movements. They are, however, good hands at bird-catching. Creeping slowly along the

branches of trees at night, they quickly but with determined grasp catch and hold the little birds at roost, and eat them alive, generally beginning by biting off the bill. In captivity they feed the same as the galagoes.

LIONS, TIGERS, LEOPARDS (*FELIDÆ*).

In captivity the *Felidæ* feed upon the flesh of other animals, and, as a rule, in most collections the flesh of horses and oxen is used on account of the large quantity they consume; as, for instance, a lion or tiger of full growth will eat from 9 to 12 lbs. of flesh every day; a leopard from 4 to 7 lbs.

There can be no doubt but the most natural and best method of feeding these animals would be to let them have the body or part of the body of much smaller animals than horses or bulls, so that they could eat the small bones, skin, intestines and all, with the blood contained in the blood-vessels.

Experience has proved that lions which have been fed upon the flesh only of large animals do not breed freely, and rarely have perfect offspring; the defective palate of the young being the most frequent and almost constant character of imperfection.

The certainty of this has now been fully established by observations made on animals bred in captivity.

CHEETAH (*FELIS JUBATA*).

Requires careful feeding. Never let them over-feed, or attempt to move them from one cage to another immediately after a meal. They often have fits if frightened or driven about. Small portion of beef, mutton, pigeons, and ducks' or fowls' heads, etc.

COMMON GENET (*GENETTA*) AND CIVET CAT (*VIVERRICULA*).

Feed much the same as the ichneumon (*Herpestes*). As often as possible give bread-and-milk, or boiled rice-and-milk, to keep them cool in hot weather; because during the summer, from want of exercise, if fed too well they get fat, often mangy, and out of health.

PALM-CIVETS (*VIVERRIDÆ PARODOXINE*).

Easily kept. They require fresh meat raw or cooked, small birds, or mammals, bread-and-milk, boiled rice-and-milk, with sugar or honey. They will eat ripe fruit.

BINTURONG (*ARCTICTIS*).

The animal appears to me to be a fruit and almost a vegetable feeder. Boiled rice with milk and sugar, honey, fruit, a little flesh raw, or better cooked, is the chief food of most of the individuals of the species I have met with. They are easily kept in confinement, and are mostly nocturnal in their habits. They must be kept warm.

ICHNEUMON (*HERPESTES*).

Feed as the suricates, but perhaps more fond of living animals, which they enjoy to kill and suck the warm blood.

SURICATES.

These feed on the same kind of food as the *Viverridæ*. They seldom eat fruit, but are fond of birds' eggs and insects; they must be kept rather short of food than *over fed*, as they are very liable to fits in captivity.

HYÆNAS.

No difficulty is experienced in feeding these animals. The roughest of animal substances; the bones are devoured as well as the skin and flesh.

WOLVES AND FOXES (*CANIDÆ*).

Wolves and foxes are kept with great ease. They like fresh food, but are not very particular as to what it may be; small birds and small animals are however better for them than the larger kinds. The wolves can, however, tear up and devour the larger kinds of game; consequently the flesh of the horse or any other animal will not come amiss to them. The smaller and more delicate foxes, especially the "Fennec," require small animals, and eat even insects and fruit. In captivity bread-and-milk and cooked tripe is excellent food for them in lieu of small birds and mice.

BADGER (*MELES*); RATEL (*MELLIVORA*).

These animals will thrive well on raw or boiled flesh; bread- or rice-and-milk, sweetened with sugar or honey.

KINKAJOU (*CERCOLEPTES*).

Sweet bread-and-milk, boiled rice, honey, fruit; rarely animal food.

GRISON AND TAYRA.

May be fed and treated as stated for ichneumon (*Herpestes*) and civet cats (*Viverridæ*).

SKUNK (*MEPHITIS*).

Feed as directed for *Herpestes* (ichneumon).

OTTER (*LUTRA*).

Require a lighter food, such as fish and frogs; they do not object to small animals, birds, etc. They require to have the free run of water, otherwise their eyes are likely to suffer.

RACCOON (*PROCYON*); COATI (*NASUA*).

Will eat almost anything; *Nasua* is perhaps the least particular. Meat of any kind, fruit, raw eggs, cooked rice, bread-and-milk, anything sweet, vegetables, roots, insects, etc.

POLAR BEAR (*THALASSARCTOS*).

This beast is the most strictly fish-eating of all the bears, but in captivity it can be partly fed upon bread, biscuit, etc. At the same time, it requires a strong oily or fat food. Passing a great part of its time in the water, it takes much exercise, and must be well fed, upon fish, fat (horse fat will answer), and now and then the common fish-oil (as it is called), that is, seal or whale oil.

BROWN BEAR (*URSUS*); SYRIAN BEAR, ETC.

The brown and other bears will do well on boiled rice and sweet food, bread, biscuits, roots such as potatoes (boiled), etc. They seldom require flesh or animal food in captivity.

COMMON SEAL (*PHOCIDÆ*); SEA BEAR (*OTARIDÆ*).

These animals must be fed upon fresh fish to keep them in good health. They are great feeders; a *Phoca vitulina* will consume at least 8 lbs. weight of fish per day. They must have free access to water, which need not, however, be sea-water or even salted.

MOLE (*TALPA*).

I have kept but few of these animals. They require a large supply of earthworms, and a rather large place filled with earth in which to burrow. They are therefore not easily seen unless the earth is kept in a glass tank; you may then see them now and again as they come against the glass. They soon die of hunger, and are therefore not often kept in confinement.

HEDGEHOGS.

The hedgehog is easily kept in confinement; it feeds freely upon raw or cooked meat, milk, and boiled tripe, beetles, mealworms and other insects. Small birds or mammals, eggs, snakes, and lizards are not objected to.

FLYING FOXES.

These animals are fed on fruit, such as apples, pears, bananas, figs, raisins, grapes, and almost every kind of ripe good fruit, dates, and sometimes boiled rice. They require water, and must be kept very clean; let the bottom of the cage have plenty of dry bran on it, for they sometimes drop their food on the bottom of the cage. If this is dirty they soon become sick; if they eat a little of

the bran it does them no harm. They are rather expensive animals to keep. They will eat a little boiled carrot, made sweet with sugar or honey.

FRUGIVOROUS BAT (*PTEROPUS*).

Mr. W. Jamrach informed me that on his way to England he fed the common Indian *Pteropus* upon fruit and dead birds, such as the various kinds of *Estrelda* and *Mania*, that died on the voyage, and they did well on this food.

SQUIRRELS (*SCIURUS*).

Most of the squirrels feed largely upon nuts or hard kernels. Unless they are supplied with food of this kind they rarely live long in confinement. Soft food, such as bread-and-milk, although most frequently used, is not suited to a healthy condition. Let the food be dry; hard biscuits, nuts, fruit, such as apples, berries, and vegetable substances. They sometimes eat animal food, but this is rather an exception, and it is better to avoid it altogether.

MARMOTS (*ARCTOMYS*).

Marmots feed on much the same food as squirrels, but are greater devourers of vegetables, roots, etc. They should be fed on oats and other grain, carrots, lettuce, and tender shoots of trees. Many rodents are great leaf and bark eaters, and persons who undertake to keep and feed animals ought to bear in mind how essential it is to provide constantly a change of food for them, and from time to time find a fresh kind that may prove agreeable to captive animals.

BEAVER (*CASTORIDÆ*).

The beaver feeds on the bark of certain trees, together with the tender branches and leaves, etc. These form the principal food of these beautiful animals. In captivity they do well upon a supply of grain, biscuits, roots, such as carrots, mangold, etc. They must be provided with plenty of water and a retreat underground, in order to induce them to breed.

DORMICE (*MYOXUS*).

Nuts, fruit, grain and vegetable substances, form the food of this lovely group of little animals. In captivity a little bread soaked in water or milk should be given. The milk, however, not very frequently, because it is apt to scour the animal.

PORCUPINES (*HYSTRICIDÆ*) (general).

The numerous genera and species of the great family of *Hystricidæ* can be all kept in nearly the same manner; some of them, however, are great fruit-eaters, and feed much on the tender buds of trees, but the kind of food to be given must always much depend on circumstances, and on the judgment of the person who feeds them; the season, and the different kinds of food obtainable at the time, dry clover, meadow hay, and good straw (especially when the grain is not taken away from it). This latter is most valuable for feeding animals that eat food of this kind. Many of the *Rodentia* feed much on ripe and unripe fruit as it falls from the trees.

PORCUPINE (*HYSTRIX*).

The *Hystricidæ* are by no means difficult to keep in condition. They will eat a very great variety of different kinds of food, roots, bark of trees, leaves, nuts, berries, green food, bones; the large or small bones of horses or oxen, with a small quantity of flesh on them, are in cold weather freely taken; they will cut through the leg-bones to get the marrow. They like a warm dry place to sleep in and retire to during the daytime. Hard dry biscuit, Indian corn, oats, etc., form great part of their food in confinement. They do not unfrequently breed in captivity.

HARES AND RABBITS (*LEPORIDÆ*).

Every one is supposed to know how to keep hares and rabbits, but it is not always easy to keep them in condition, and to get them to thrive well in confinement. As a rule, they have too much moist food given to them, and this always proves fatal; the drier the food the better they thrive; and, above all, they require to be kept clean, and to be given plenty of clean fresh straw. Their food should be hay, clover, oats and bran; a little green food, such as grass, cabbage, celery, parsley; and roots, such as carrots, mangold, or parsnips. For very young animals fresh tea-leaves mixed with pollard or fine bran is better than green food. Scraped carrot added to this mixture, to which a little oatmeal may also be added, has often saved a brood when the mother has been lost or killed.

RHINOCEROS.

The food in captivity is clover or meadow hay, straw, boiled rice mixed with bran, roots, such as mangold and carrots, grass, leaves, branches of trees and shrubs, bread,

biscuit, grain consisting of oats, barley, Indian corn, etc. In using such grain as barley, it is better to boil it. Indian corn should never be used unless it has been broken or boiled, otherwise there is great danger of its germinating in the animal's stomach; an instance of this kind occurred, to my knowledge: the animal having swallowed the Indian corn without crushing it, the seed germinating in the stomach of the rhinoceros killed him.

TAPIRS.

By no means easily kept in good health. These animals are subject to several disorders, and quickly go wrong; if by chance their bowels become much relaxed, they have protrusion of the gut, and exactly the same misfortune occurs if they are constipated. It is therefore of the utmost importance that the food must be varied, and a careful watch kept as to the condition of the bowels.

The tapir doubtless feeds upon fresh growing plants, and is always found near fresh-water rivers and streams, rarely about lakes. Now as it is quite impossible to obtain these plants at certain times of the year, recourse must be had to a variety of other kinds of food at all times attainable. Of these we take boiled rice, boiled potatoes, mangold, carrots, bread, bran, biscuits, boiled Indian corn, hay, clover, straw, chaff, bruised oats, beans, treacle, sugar; green food, such as grass, cabbage-leaves, and small branches of trees.

From this stock a quantity can be selected and mixed so as to suit the taste and inclination of the animal. Sometimes one will not touch the same kind of food on which another will feed freely and do well; therefore it is difficult to say what is the exact kind of food for a tapir.

Some fresh-caught tapirs do very well on yams or sweet

potatoes, and refuse all other food. They probably die when taken on board ship if there is not a supply of this kind of food.

As soon as the stock is consumed they require to be gradually weaned, and a little mixed food changed at intervals to entice them to eat. During the change much depends upon the skill and judgment of the person in charge; care and watchfulness as to the altered condition must be strictly attended to, or the animal will be lost.

GIRAFFE.

The food of the giraffe in captivity must be as dry as possible, such as good old English clover-hay, crushed oats, beans, bran, crushed Indian corn, chaff with straw; roots, such as mangold, carrots, and particularly onions, are good for them, and in summer a little green tares.

SHEEP AND GOATS.

Wild sheep require much care in this climate, especially in this locality; those sheep from the mountains of Asia on the dry and hot or dry and cold countries must be carefully fed at all times. They are very liable to get out of order soon after arrival here. Green or moist food must be used very sparingly; they are in the habit of becoming relaxed, and this condition in many of the animals proves fatal; therefore the drier the food the better, such as good clover or meadow hay, oat-straw, crushed oats, beans, carrots, mangold, tares; a little grass now and then would be of service.

A fine young male (*Ovis vignei?*) that arrived from the Punjaub was nearly lost as it took to purging, and eat but little for several days. Finding this, I gave it a quart of the best millet seed each day, viz. a pint in the morning

and a pint in the evening, added to the other food, consisting of clover, etc. In less than a week the animal recovered its appetite, and became perfectly well and strong.

Goats are generally more hardy than sheep, but may be treated in the same manner. All ruminating animals should have a lump of rock-salt in their houses, they lick so much as they require and no more. There is no danger of them taking more than is good for them.

DEER (*CERVIDÆ*).

The elk, deer, and goat feed on the same kinds of food as the camel, with an addition of a little crushed Indian corn now and again, this as a change; but in the case of the camel I find the Indian corn has a tendency to increase the mangy state of its skin. I therefore avoid this kind of food for the camel.

THE CAMEL (*CAMELIDÆ*).

The food of the camel should be dry clover or meadow hay, chaff, bran, oats, carrots, mangold and onions. Camels are very fond of onions, and occasionally they have a quart or more in cold and bad weather. They should be fed twice a day, but they generally get fed with buns, biscuits, bread, etc., by the visitors. I find these animals do best when they are used to carry the children. Unless they are well under control and have a very good driver they are very dangerous; an ill-tempered man should not be in charge of the animal, but one with plenty of patience and determination.

If the beast is much ill-used he is sulky and troublesome, but with fair treatment may be rendered very tractable. The camel's skin is likely to become mangy,

and I find the best remedy is to rub in dry sulphur in the powdered state. Camels never wash, but they always have plenty of water near them and drink when they think proper. During the summer they have green food such as tares and grass, but not in large quantities.

HIPPOPOTAMI.

The hippopotamus is a greedy feeder. In warm weather its usual daily meal consists of a large supply of the commonest grass, with a feed of bran, crushed oats, chaff, and a few roots. In the winter meadow hay serves instead of grass, with a good supply of mangolds, carrots, and straw. A large tank of water must be supplied for the beast to swim in at all seasons, as unless it can have access to water the skin becomes diseased and cracks, and the life of the animal is soon endangered by the drying of the skin.

The hippopotamus born on November 5, 1872, began to feed with its mother a few days after its birth. It was supplied with boiled mangold crushed into a pulp, mixed with bran, sugar, Indian corn-flour, and fine chaff (cut meadow hay).

Carefully avoid giving the animal fine, long hay; it collects in a ball in the stomach of many young animals before their teeth grow.

SLOTH (*EDENTATA*).

The sloths, I have no doubt, are strictly vegetarians. I have never had one that would eat flesh or animal substance of any kind, the nearest approach being bread-and-milk. They do well in confinement on green food and bread-and-milk; they eat fruit of various kinds, and are very fond of lettuce, leaves of plants, bananas, figs, etc.

DASYPUS ARMADILLOS (*DASYPODIDÆ*).

Much like the ant-eaters, these animals feed principally upon animal substances, insects in the larva or chrysalis state, birds' eggs, young reptiles, and, in fact, some of the species will eat almost any kind of flesh or garbage. I believe that in some parts of South America they literally swarm in the neighbourhood of slaughtering places, eating the offal of the slaughtered cattle. No better food can perhaps be found for them than raw flesh, ground fine and mixed like sausage-meat with bread-and-milk; occasionally some change being given, say a few dead birds or small mammals, some tripe or other parts of animals.

ANT-EATERS (*MYRMECOPHIDÆ*).

Having for several years succeeded in keeping alive the following members of this family, viz.:—

M. jubata,
Two species of *Tamandua*,
Two „ „ *Orycteropus*,

I may fairly claim to be in a position to say that they can, without difficulty, be preserved in a healthy condition if the following instructions be carefully attended to.

On the bottom of the den place a layer of good soft earth, tolerably dry, and at least 10 in. or 12 in. deep. In the den there should be a snug warm corner, or box, filled with dry straw for a bed. Grind, in a sausage-machine, daily, about 3 lbs. of raw flesh (not fat); add to this 2 lbs. of bread-and-milk, then well mix the whole together. An adult *M. jubata* will eat this quantity of food twice each day. The small species will of course eat less; they also eat soft fruit, such as pears, bananas, and *M. jubata*

will swallow full-grown mice, which should be killed, and held to his mouth head first.

The earth should be changed as often as possible for the sake of cleanliness.

DASYURE (*DASYURUS*).

These animals are more strictly flesh-eating than are the opossums, and although they can live upon bread-and-milk for a time, they thrive better on flesh. They will eat insects; and the smaller kinds of this species probably almost entirely exist on insects and small animals.

OPOSSUMS (*DIDELPHYS*).

These tree-climbing animals feed upon a variety of different kinds of food, fruit, and animal substances. On the former they are not able to live entirely; and of animal and insect food they appear to be most fond.

In captivity, I find that bread-and-milk, sometimes with egg added, and at other times boiled rice with sugar and ripe fruit, will keep them in condition. They are, however, most fond of young birds, as well as mice and other small animals. Raw or cooked flesh will answer from time to time.

MAGPIES.

The young magpie can be fed on a great variety of substances, such as raw or cooked meat, bread-and-milk, meal made stiff like dough, boiled rice, potatoes; in fact, a little of everything that is used at table; but supposing the bird is kept where there is no table, then a little raw beef, or cat's meat, a hard-boiled egg mixed with a little pea-meal, will make the magpie a good supply of food for a day or two. The more the food is varied, like that of the rooks, the better.

MYUAKS.

Hard-boiled egg, potatoes boiled, carrot boiled, and boiled rice; the above chopped up and mixed together. Fruit, grapes, bananas, ripe apples, pears, or any kind of fruit, now and then a little raw meat, mealworms, and other insects. In fact, they will eat almost any kind of food, but salt food or fat must be avoided.

MACAWS.

The macaws eat Indian corn and other seeds, biscuits soaked or otherwise, nuts, fruit, avoiding fat or salt meal. Macaws require water.

PELICANS (*PELICANUS*).

They should have a good-sized pond to wash and feed in. If, however, it is not convenient to feed them in the pond they will take the food out of a tub or pail of water. The pond should be supplied with clean water, as the beauty of the bird depends upon being perfectly clean. They eat rather a large quantity of fish; *feed them once a day*, each bird having five or six pounds of fish.

Stale or stinking fish is dangerous, and all fish must be carefully examined for fear of fish-hooks. Many fish-eating animals are killed by the hooks sometimes left in fish.

COMMON HERON (*ARDEA*).

The herons are not active birds, they require water in which they will wash.

They are fed on the cuttings of fish and raw flesh; they will swallow rats, mice, frogs, small birds or, in fact, almost

any kind of animal substance. I do not think it safe to give them any putrid or stinking food, for in their wild state they capture their food alive, and seldom eat any garbage as the adjutants and storks are in the habit of doing.

SWANS, DUCKS, ETC.

These birds are more easily fed and require less attention than almost any other birds, their food consisting of grain, biscuit, and water, to which may be added a little sand or gravel to assist the digestion.

To each swan rather less than a pint of barley per day is to be given in the water, to this one or two handfuls of gravel may be added, and a little biscuit now and again, The ducks and geese are fed in the same manner, about a pint of barley daily being sufficient for four ducks, gravel and biscuit occasionally.

DUCKS.

In order to keep ducks in good health while in transit, I find it is best to mix some sand or fine gravel with the food, and to have one or two mats that fit the inside of the bottom of the cage. The mats are soft to their feet. By leaving an opening that will admit of the mats being drawn out and washed, they are easily kept clean, and also prevent the feet of the birds becoming sore.

WOOD GROUSE (*CAPERCAILLIE*).

Almost as soon as the birds are hatched they require some soft food, and I have supplied them with fresh ant eggs, so called, but in reality the pupæ of the great black ant,—large numbers can be obtained in most pine forests; custard composed of the yolks of eggs and milk; to this

I have added pea-meal to render it somewhat dry, as by itself it is too moist. In a day or two I give the young birds a mixture of millet, canary, and crushed hemp-seed, with finely-chopped lettuce or other suchlike green food, and from time to time throw them a few mealworms, grasshoppers, or well-cleansed gentles; in lieu of these some finely-chopped meat, taking care they always have plenty of fine gravel, and also water. I also recommend that the water should be boiled and allowed to cool before using.

CURASSOWS.

To a quart of Indian corn mix one pint of wheat and one pint of barley. Of this mixture give about half-a-pint to each bird daily; a little biscuit, bread, or potatoes will be very acceptable to them. Almost any kind of vegetable, such as carrots, onions, etc.; a little meat, such as the cuttings of poultry, may be given them; meal mixed up into pudding is also good. They require water the same as common barn-door fowls. Coarse gravel must be given occasionally; a handful thrown in now and then among the grain food.

CRANES (*GRUS*).

These lively, graceful and beautiful birds are easily kept. They feed upon grain, insects, hard biscuit, flesh, and fish; they do not, however, require much of the animal food; flesh and fish are only as compensation for the lack of insect food. The grain most suitable for cranes of all the different species is Indian corn; this may be given dry, but in case the birds are weak or freshly imported, it is better to have it soaked or boiled soft. They are fond of wheat and barley, earth-worms and grubs, snails, etc. They frequently breed in captivity. They should have a

good-sized paddock, and plenty of dry rushes with which to make a nest, and they should also have a little protection in the winter. A shed at night during hard frost is desirable for most of the tropical species. Some are sufficiently hardy to be kept out at all seasons, as has been the case with the following :—

Common Crane	... ...	*Grus cinerea.*
Mantchurian	... ...	*G. Montiguesia.*
Brown American	... ...	*G. Canadensis.*
Demoiselle	... ...	*Anthropoides virgo.*

EMU (*DROMÆUS*).

Feed upon vegetables such as cabbage, lettuce, grass, etc. Boiled potatoes, bread, biscuits, a little raw meal, young rats, mice, boiled Indian corn ; in fact, they are not very particular as to food, and they breed freely if properly treated. They require a good-sized place for a run. A shallow pond is good for them in which to roll and wash ; an open shed as shelter in wet and bad or frosty weather. They require a lot of litter, dead leaves, and rubbish of this kind for a nest. The male bird does all the nest-making and sitting on the eggs, which require seven weeks to hatch. The male only attends to the young ones. They should be fed on chopped green food, bread, hard-boiled eggs chopped up with the bread. In feeding the emus a bunch of greens or cabbage hung high enough for the birds to pick at is better than any other plan of feeding them, as they help themselves and do not trample the food under their feet.

TUATERA LIZARD (*SPHENODON PUNCTATUS*).

During the last twenty years living specimens have been under my care. Many of these have been distributed

and placed in other collections, many have lived for years under my treatment, and several are now in my charge.

I have fed them on a variety of different kinds of food. They will eat raw meat, living frogs, small lizards, earthworms, mealworms, snails, young birds, and also mice.

I have tried them with a great many kinds of vegetable food, but I have never found them to eat any kind whatever. I have heard from persons who have kept these animals that they fed them upon lettuce-leaves and fruit. I have always had much doubt about their feeding upon this kind of food, and I found the animals died after a few months of this treatment, and I feel certain they were starved to death.

It is well known that many of the animals of this family can exist for a very long period without food, and consequently persons not well acquainted with this fact were led to believe that the tuatera fed upon the vegetable food, because it lived so long.

In the New Zealand Court of the Indian and Colonial Exhibition, South Kensington, was a model of the rocks and small caves inhabited by the tuatera lizards. I noticed also that these rocks and caves were frequented by small sea-birds, which selected the same places for breeding. I have no doubt whatever that the lizards would find the eggs and young of these small sea-birds most excellent eating.

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